

THE AUK:

A QUARTERLY JOURNAL OF
ORNITHOLOGY.

VOL. XXXII.

OCTOBER, 1915.

No. 4.

IN MEMORIAM: THEODORE NICHOLAS GILL.¹

BORN NEW YORK CITY MAR. 21, 1837; DIED WASHINGTON
D. C., SEPT. 25, 1914.

BY T. S. PALMER.

Plate XXVI.

THEODORE NICHOLAS GILL, 'Master of Taxonomy' — such was the characterization by Dr. David Starr Jordan of the man whom Prof. Spencer F. Baird called the most learned, and Prof. G. Brown Goode described as the most erudite and philosophic of American naturalists. His interest in various subjects was as great as his breadth of view and extended not only throughout the field of zoölogy but also into paleontology, philosophy, language, and other fields of human interest. Questions of Greek grammar, conchology, ichthyology, mammalogy, nomenclature, osteology, and the evolution and geographic distribution of organisms living or extinct all engaged his attention. He was equally at home in biography or biology, etymology or entomology, and among mollusks or mammals.

Theodore N. Gill, son of James Darrell and Elizabeth Vosburgh Gill, was born in New York City, March 21, 1837, and was educated in private schools and under private tutors. He took no

¹ Address delivered at the thirty-third Stated Meeting of the American Ornithologists' Union, San Francisco, Calif., May 18, 1915.

regular college course and although he studied law was never admitted to the bar. At an early age he became interested in natural history and especially in fishes which afterward formed the subject of his special studies. In the markets of New York which he frequently visited he was able to examine some of the rarer species which were brought in from time to time by commercial fishermen.

At the age of 20 in the winter of 1857-58 he took his first extended field trip, visiting Barbados, Trinidad and other islands in the West Indies where he collected shells and other specimens for Mr. D. Jackson Stewart. The results of this trip were worked up chiefly in the library of Mr. J. Carson Brevoort and appeared in the *Annals of the Lyceum of Natural History of New York* and the *Proceedings of the Academy of Natural Sciences of Philadelphia*. It was probably in the Brevoort library, then one of the best of its kind in this country, that he laid the foundations of that broad and intimate knowledge of books which in later years became such a distinguishing characteristic. His second collecting trip, and apparently the only other extended field trip he ever undertook, was made in the summer of 1859 to Newfoundland.

► About 1860, Gill came to Washington, D. C., and took up his residence in the national capital, which was henceforth to be his home and which for more than half a century was destined to be the scene of his literary and scientific activities. Here he found congenial surroundings and settled into a life which almost never took him into the field and seldom involved trips farther than New York or Boston,¹ but his interests were world wide and were not measured by his travels. *Dum domi mansit orbem pervagabatur* (while he remained at home he wandered throughout the world). It is interesting to note that Gill reached Washington just about the outbreak of the Civil war but the events of those stirring times seemed to have had little effect on his career. Here he met Professor Baird and others who were then prominent in scientific work. Baird was Assistant Secretary of the Smithsonian Institution and had but recently completed his great works on the mammals and birds of the Pacific Railroad Surveys. Coues was a student in

¹ It is said that at one time he was offered an attractive position by Professor Agassiz at Cambridge, but decided not to leave Washington.

Columbian College and Ridgway, a boy not yet in his teens, was living at his home in Illinois and had not actively entered the field of ornithology.

Gill became associated almost immediately with Columbian College, afterward Columbian University, and now George Washington University, a connection which he maintained until his death. In 1860-61 he was adjunct professor of physics and natural history, in 1864-66 and 1873-84, lecturer on natural history, from 1884-1910 professor of zoölogy, and during the last four years of his life professor emeritus. His classes were not large but he always maintained his interest in the zoölogical department and especially in the graduate work. His services were appreciated by the University which bestowed upon him at various times four honorary degrees: A.M. in 1865, M.D. in 1866, Ph.D. in 1870, and the highest doctorate, LL.D. in 1895.

Whether Coues and Gill were officially associated in the early days is uncertain. Dr. D. G. Elliott records that about this time "when on a visit to Professor Baird in Washington, one evening, in company with my old friend Doctor Gill, I first met Elliott Coues,"¹ indicating that Gill knew Coues and introduced Elliott to him. Coues was actively interested in birds at this time and had just published his "Monograph of the Tringæ of North America" which he later described as the "maiden effort of a very youthful author." He was also busy with D. W. Prentiss in preparing 'A List of the Birds of the District of Columbia' which appeared in 1862. Coues took his bachelor's degree at Columbian College in 1861, graduated in medicine and received his commission as Acting Assistant Surgeon in the Army in 1863, and in the following March was detailed as Assistant Surgeon to Fort Whipple, Arizona. He was absent from Washington at various military posts for some years, and it was not until the late seventies or early eighties that he and Gill became associated in the first of their joint zoölogical publications.

Through the assistance of Professor Baird Gill received an appointment in the library of the Smithsonian Institution. In 1865-66 he served as librarian and when the library of the Smithsonian

¹ D. G. Elliott, *In Memoriam Elliott Coues, Auk, XVIII*, p. 5, 1901.

was transferred to the Library of Congress he acted as assistant librarian in the Library of Congress from 1866-75. This decade devoted to constant work with scientific books was invaluable in enabling him to familiarize himself with the literature of zoölogy. With his wonderfully retentive memory he stowed away many a fact and many a title which in after years he had occasion to use in the preparation of his papers. Apparently he never forgot a book which he had once handled and long afterward he could assert with confidence that a certain volume was in the Library of Congress, although he might not have seen it for many years.

At the first meeting of the American Ornithologists' Union held in New York on September 26, 1883, Doctor Gill was elected an Active Member and remained in the list for thirty years. In 1913, only a year prior to his death, he was transferred to the recently established class of Retired Fellows, and his was the first name to be enrolled in the list of Deceased Retired Fellows. He seldom attended meetings of the Union outside of Washington, but he was present at most if not all of those held at the National Capital. He seriously considered attending the special meeting in San Francisco in 1903 but finally abandoned the plan, although he had long been desirous of visiting the west coast. He frequently took part in the discussion of the more general topics but apparently contributed only one formal paper—entitled 'The Generic Names *Pediocætes* and *Pooætes*'.¹ He held no offices during his long connection with the Union but rendered valuable aid to the Committee on nomenclature at various times. His name does not appear in the list of those who assisted in the preparation of the original Code and Check-List of 1886, but the obligation of the committee is attested in a special note published in *Science*.² When the subject of the revision of the Code was considered at the meeting held in 1905, he was appointed one of the seven members to whom the task was delegated.

Gill was a member of many other scientific societies and was a regular attendant at their meetings in Washington or in nearby cities. He was elected a member of the American Association for

¹ Auk, XVI, pp. 20-23, 1899.

² VII, p. 374, Apr. 23, 1886.

the Advancement of Science at the 17th Meeting in Chicago in 1868, and became a Fellow in 1874. In 1896 he was Vice-President of Section F on Zoölogy and upon the death of the President, his life long friend, Prof. E. D. Cope, on April 12, 1897, as senior Vice-President, he succeeded to the Presidency of the meeting held in Detroit in that year. In 1873 he was elected a member of the National Academy of Sciences and represented the Academy at the International Zoölogical Congress at Boston in 1898, and at the 450th anniversary of the founding of the University of Glasgow, at Glasgow, Scotland, in 1901. He was a member of the American Philosophical Society, the Biological Society of Washington, the Cosmos Club, one of the honorary vice-presidents of the Audubon Society of the District of Columbia, a foreign member of the Zoölogical Society of London, and a member of more than 70 other scientific organizations. In 1894 he was made associate in zoölogy of the U. S. National Museum. He was one of the founders of the Cosmos Club in 1878, of the Biological Society in 1880, and of the District Audubon Society in 1897. He served as the first president of the Biological Society in 1881 and 1882, as chairman of the Committee on Publications in 1894-95, and frequently presented papers and took part in the discussion of papers presented by others. It made little difference what subject was under consideration, Gill could almost always add something to the information imparted by the speaker. On one occasion when a paper on Cretaceous fishes was presented, Doctor Gill dissented radically from the views of the author of the paper and as a result the discussion soon waxed warm. No one in the audience except the author and the critic had more than a superficial knowledge of the subject, but every one present followed with deepest interest as each participant in the debate sought to overwhelm the other with fresh arrays of facts and polysyllabic names of fossils which none save the speakers could understand.

This is not the time or the place to attempt a review of Doctor Gill's voluminous publications. The number of titles in his bibliography exceeds 500, most of them on the subject of fishes. His best known works consist of his Arrangements of Mollusks, Fishes, and Mammals, his volume on Fishes, and part of the volume on Mammals in the Standard or Riverside Natural History, the con-

tributions to zoölogy in Johnson's Universal Cyclopedias, and the Century and Standard Dictionaries. He published no great monographs in the ordinary acceptation of the term and no comprehensive work on natural history, evolution, or geographic distribution, although few men were better qualified for such a task. He devoted most of his attention to essays, revisions of groups, short papers on special subjects, notices, and reviews.

Birds received but a small part of his attention. His publications on ornithology may be conveniently divided into three groups: (a) A series of annual reviews in the 'Summaries of Scientific Progress,' 1871-1885; (b) contributions to 'Johnson's Cyclopedias,' miscellaneous essays on distribution and nomenclature; and (c) articles and notices in 'The Osprey.' These may be briefly considered in the order indicated.

In 1871 Harper and Company undertook the publication of the 'Annual Record of Science and Industry,' edited by Professor Baird, who had associated with him a number of well-known scientific men to take charge of special subjects. Abstracts and summaries of the more important articles of the year were published in Harper's Weekly and Harper's Monthly and later collected into an annual volume, prefaced by a general account of the progress of the year in each department. Doctor Gill contributed the material on vertebrate zoölogy. Each volume contained a bibliography and brief necrology, thus forming a convenient but condensed account of the progress of the year. The series was discontinued in 1878, but Professor Baird who had become Secretary of the Smithsonian Institution in May of that year arranged for the publication of a Record of Scientific Progress in the Annual Reports of the Institution. The first installment covering the years 1879-80 appeared in the volume for 1880, thus continuing without interruption the 'Annual Record' formerly published by the Harpers. To this series, extending through the years 1879 to 1885, Gill contributed the chapters on zoölogy covering the whole field from Protozoa to Primates. Necessarily the sections devoted to birds were brief and usually condensed to less than half a dozen pages. Only the more important discoveries or publications could be noticed, but they were selected from the whole field of ornithology and included extinct as well as living birds and notices of articles

on cage birds, ostrich farming, anatomy, and physiology in addition to descriptions of new species and reviews of faunal works and museum catalogues.

In the volumes for 1881 and 1882 he introduced a feature of special interest which might well be revived today, namely, a list of "Birds Added to the American Fauna," including new species and extralimital species recorded for the first time within the limits of North America. Twelve species were included in the list for 1881 (p. 487) and 21 species in that for 1882 (pp. 628-29). Such a list published in the January number of 'The Auk' would be a very convenient annual record of the new forms to be considered as additions to the Check-List.

Gill's comments on some of the articles while necessarily brief are characteristic. Thus in speaking of a paper on the classification of birds by Dr. P. L. Sclater which had recently appeared,¹ he says: "The tendency to give an exaggerated value to trivial characters still lingers. One author, for example recognizes two *sub-classes* and 26 *orders* in this most homogeneous of types, and for the little morphologically diversified Passeres not less than 53 families are provided!"² This statement suggests Gill's earlier expression of his views, in what was apparently one of his first publications on birds, which appeared in the Introduction to Baird, Brewer, and Ridgway's 'History of North American Birds.' This contribution although signed with his initials is easily overlooked, and the circumstances attending its preparation do not seem to be generally known. Gill himself states³ that one bright afternoon in August, 1873, while a guest of Professor Baird at Peake's Island, near Portland, Me., having been requested to prepare the Introduction to the 'Land Birds' then nearing completion he dictated to Baird's secretary the paragraphs which form pages xi-xiv of the 'History.' It was only natural that Baird should have invited Gill who had published two or three years before his remarkable Arrangements of the Families of Mammals and of Mollusks to undertake a similar task for the birds. Upon his return to Washington, Gill collected all the skeletons and skulls of birds available

¹ *Ibis*, IV, 1880, pp. 340-350; 399-411.

² *Smithsonian Rept.*, 1880, p. 377.

³ *Osprey*, III, p. 91, Feb. 1899.

in the hope of working out 'anatomical characters that would co-ordinate with the external characters generally used to distinguish families.' In this effort he failed utterly and abandoned the undertaking, declining to complete the introduction in which his views on classification were so at variance with those of the authors. This introduction was finally completed by Doctor Coues. Thus began the first of several literary ventures in which Coues and Gill were associated and which finally resulted unhappily a few months before Coues' death in the severe straining if not in the breaking of a friendship of nearly forty years standing.

For present purposes the contribution of 1873 is chiefly interesting because it contains Gill's definition of birds and the brief statement of some of his views on Avian classification. This definition is remarkable from the fact that it describes a bird in a single sentence, but this sentence includes 312 words and fills the greater part of a page! As an example of word building about a single idea it is one of the most comprehensive in the annals of ornithology. The first few lines carrying the description through the brain will suffice to illustrate his ability in writing definitions:

"Birds are abranchiate vertebrates, with a brain filling the cranial cavity, the cerebral portion of which is moderately well developed, the corpora striata connected by a small anterior commissure (no corpus callosum developed), prosencephalic hemispheres large, the optic lobes lateral, the cerebral transversely multifissured," etc.

This definition recalls the anecdote mentioned by Doctor Lucas¹ in connection with the publication of the Century Dictionary some years later. Coues was in charge of the preparation of the zoölogical terms and Gill associated with him prepared chiefly the definitions of mammals and fishes. When Gill submitted a definition of the family of Giraffes Coues read it carefully and turning to Gill exclaimed, "That isn't English, it is Choctaw." "No," said Gill, "it is an exact definition of the family Giraffidae," and as such it was duly incorporated in the Dictionary.

Gill's later ornithological papers appeared in 'The Osprey' during the four years that it was published under his supervision. Before considering these papers it may be interesting to mention some of

¹ Am. Mus. Journ., XV, p. 10, 1915.

the circumstances connected with the history of this rather remarkable journal. Shortly after the death of Professor Cope in April, 1897, the 'American Naturalist' which had been conducted by him in conjunction with Professor Kingsley, changed hands and beginning with the September number was placed under new editorial supervision. For some time Gill had been desirous of acquiring control of a scientific journal and it was afterwards a source of regret to him that he had not secured 'The Naturalist' when the opportunity was presented.

A year or two previous a well illustrated magazine of popular ornithology called 'The Osprey' had been established by Walter A. Johnson at Galesburg, Illinois. Within six months Doctor Coues became associated with Johnson and for a while contributed a column to each number. Coues at this time was devoting considerable attention to ornithology in connection with the preparation of the fifth edition of his 'Key to North American Birds' and 'The Osprey' evidently afforded a convenient medium for the publication of short notes. At the close of 1897 the publication office of 'The Osprey' was transferred to New York, and Johnson, having engaged in other business, was anxious to be relieved of the editorial work. The magazine was therefore offered for sale. Under these circumstances it is not surprising that Gill, who was looking for a journal, and Coues, who was already interested in 'The Osprey,' should have become associated in the management of the magazine. Gill acquired 'The Osprey' in October, 1898, beginning his work with the first number of Volume III. The office of publication was transferred to Washington and under the joint editorship of Coues and Gill the magazine began a new chapter in its eventful career. It might have been expected that under such able management 'The Osprey' would have prospered, but the combination proved disastrous. Coues who contributed most of the editorials and supervised the makeup began to treat the magazine as a toy and evidently soon tired of the routine work. The editorials at first in humorous vein soon grew sarcastic and became so sharp that Gill, thoroughly disgusted, withdrew his name from the numbers for April and May, 1899. In the June number appeared the statement that Coues had retired and Gill had assumed full control. With the beginning of Volume IV in October the announcement

was made that 'The Osprey' would be edited by Gill in collaboration with Robert Ridgway, Leonhard Stejneger, F. A. Lucas, C. W. Richmond, Paul Bartsch, Wm. Palmer, H. C. Oberholser, and Witmer Stone. With such a galaxy of talent the future of the journal was very promising. Doctor Gill financed the venture, Doctor Bartsch attended to most of the routine work and the collaborating editors contributed occasional articles and notes. But after two years this plan was abandoned, the form of the magazine was changed and a new series begun in January, 1902. Only a few numbers appeared and the journal was finally suspended in the following July.

Among the more important of Gill's contributions to 'The Osprey' were his plan for a new history of North American Birds,¹ his biographies of Swainson,² Richardson,³ and Cassin,⁴ his articles on Longevity in Birds,⁵ and on the Bower Birds of Australia and New Guinea.⁶ Many short biographical and critical notes were introduced under his editorship and the character of the journal was considerably changed. His plan for what he termed 'generalized' biographies of birds was outlined in the number for February, 1899, p. 88, under the caption 'A Great Work Proposed.' After calling attention to three great works on North American Birds, viz. those of (1) Wilson, (2) Audubon, and (3) Baird, Brewer, and Ridgway, he remarks that Wilson and Audubon's works observed no classification and were merely unconnected descriptions and biographies of species without logical sequence, while Baird, Brewer and Ridgway introduced system and generalization of the classificatory data but no generalization of the biographical information. Moreover a quarter of a century had intervened since the publication of the *Land Birds* and much new data had been collected. His plan for the new work may well be described in his own words:

¹ *Osprey*, III, 88-94, Feb. 1899.

² William Swainson and His Times: *Osprey*, IV, pp. 104-108; 120-123; 135-138; 154-156; 166-171; V, 8-10; (23-25; 29-30); 37-39; 58-59; 71-72; 136-137; 152-155; 167-172, 176, Mar. 1900-Nov. 1901.

³ *Life and Ornithological Labors of Sir John Richardson*, New Ser., I, 13-17, Jan., 1902.

⁴ *Biographical Notice of John Cassin*, New Ser., I, 50-53; 80-84. Mar., May, 1902.

⁵ *Osprey*, III, 157-160, June, 1899.

⁶ *Osprey*, IV, pp. 67-71, Jan., 1900.

"The time has come to commence another ornithology, to gather the harvest scattered in many fields, to bring it together in a new granary. A very decided improvement too, can be effected, it seems to me, in the treatment of the life histories of the beings to which we are devoted.... One of the features that would be most desirable in the new Avifauna would be a recapitulation of the habits common to all the species of a genus under the generic caption. In fact a summary of all the ecological features characteristic of the combined species, and an indication as to the range of difference or divergence.... The various biographies should be prepared on a regular plan and the data given in a uniform sequence for each species and a summary furnished for each genus. The deficiencies in our knowledge could then be perceived at once, and some one of the numerous observers might be incited to fill the void...."

Naturally the first biography published was that of the species after which the journal was named, the Osprey. This was begun in September, 1900, a year and a half after the announcement and was continued in installments through nine numbers to September, 1901, making in all a publication of about twenty pages.¹

As already indicated, Gill's contributions to ornithology are not to be measured by his formal papers. Indeed his titles on birds are so few and so widely scattered that they scarcely appear in ornithological bibliographies and are apt to be overlooked unless the search be extended to include somewhat obscure nooks and corners. Nevertheless his influence made itself felt in many quarters and his ideas and suggestions may be found in several standard works on ornithology, in the Code of Nomenclature, and in the zoölogical parts of the Century and Standard Dictionaries and Johnson's Cyclopædia. His was an indirect rather than a direct influence, as gentle and persuasive as his personality, but none the less real and effective. His suggestions and criticisms, always made in a kindly spirit for the assistance rather than the discomfiture of the inquirer, bore rich fruit in the works of others.

Gill's views on the classification of birds were very positive and in some respects widely divergent from those of most American ornithologists, but he was interested chiefly in the relation of the higher groups and paid little attention to species and subspecies. Apparently he never described any new species of birds but in

¹ Vol. V, pp. 11-12; 25-28; 40-42; 60-61; 73-76; 92-93; 105-106; 124-125.
141.

recognition of his eminent work in systematic zoölogy two birds have been named in his honor by other ornithologists. These are: Gill's Albatross, *Diomedea gilliana*, described by Dr. Coues¹ in 1866 (now regarded as probably the young of *Diomedea melanophrys*), and an extinct species of quail, *Palaeotetrix gilli*, described by Dr. Shufeldt² in 1892, from the Pleistocene of Oregon.

Reference has already been made to Gill's futile attempt in 1873 to discover structural characters of family and ordinal value. Briefly stated, he considered that all living birds should be combined in a single order for which he proposed the term Eurhipidura, or birds with a well developed fan-like tail. Among extinct birds he recognized two orders, Saururæ, or birds with a reptile-like tail, represented by *Archæopteryx*, and Ichthyornithides represented by *Ichthyornis* and *Apatornis*. These views were first embodied in a paper on 'The Number of Classes of Vertebrates and their Mutual Relations'³ presented to the National Academy of Sciences at the meeting of October 29, 1873, in the year in which he was elected to membership in the Academy. In contrast to these views it is interesting to note that Baird, Brewer, and Ridgway in 1874 recognized no less than fourteen orders of Carinate birds and fifty-nine families of North American Birds.

A quarter of a century later Gill restated his views more at length:⁴

"The attribution to the so-called orders of birds of that rank is a sin against classification, as well as the truth, which should not be persisted in.... I would scarcely recognize any orders among living birds — certainly not more than two.... For provisional purposes the orders of most ornithologists might be designated as suborders and the so-called suborders wou'd have about the value of superfamilies....

"Most of the generally admitted families of birds outside of the Passerines appear to me to be well founded, but I cannot regard the Oscine so-called families as such.... To entitle the sections of Oscines generally called families as such, is to obscure and falsify our knowledge of structure and to give a distorted idea of the group....

"Objects should be called by their right names. If the groups in question are confessed to lack family characters, they should not be designated

¹ Proc. Acad. Nat. Sci. Phila., May 1866, p. 181.

² Journ. Acad. Nat. Sci. Phila., Ser. 2, IX, p. 415, pl. xvii, fig. 34, 1892.

³ Am. Journ. Sci. & Arts, 3d ser., VI, pp. 432-435, Dec. 1873.

⁴ Osprey, III, pp. 90, 91, Feb. 1899.

as families. Let a lesson be taken from other zoologists. There are families of insects — the Carabids and Scarabeids among beetles, and the Ichneumonids and Chalcidids among Hymenopters, for example — which contain nearly as many as or even more species than are known of birds, and yet there is no great difficulty in subordinating the constituent groups under a family designation."

Again reverting to this same subject in his address before the Seventh International Zoölogical Congress¹ at the meeting in Boston in 1907, he suggested the following solution of the difficulty:

"One consummation devoutly to be wished for is a general acceptance of a standard for comparison and the use of terms with as nearly equal values as the circumstances admit of. There is a great difference in the use of taxonomic names for the different classes of the animal kingdom. The difference is especially great between usage for the birds and that for the fishes. For the former class, genera, families and orders, are based on characters of a very trivial kind.... The mammals are a class whose treatment has been mostly intermediate between that for the birds and that for the fishes. Its divisions, inferior as well as comprehensive, have been founded on anatomical characters to a greater extent than for any other class. Its students are numerous and qualified. Mammalogy might therefore well be accepted as a standard for taxonomy and the groups adopted for it be imitated as nearly as the different conditions will admit. The families of birds would then be much reduced in number and those of fishes increased."

These extracts have been quoted at length to indicate Gill's own views and to show that his criticism of ornithological classification was not directed so much against the number of divisions as the exaggerated value assigned the various groups. His strongest contention was to standardize the higher groups of birds so as to make them more nearly equal in value with those of other vertebrates. In view of his careful consideration of this question extending over a period of nearly forty years and his wide experience with other vertebrates, his conclusions are entitled to special weight however divergent they may seem to be from those now commonly accepted.

Gill's most important influence was undoubtedly the inspiration of his example in the direction of broader and more thorough technical work. In bibliography careful and exhaustive research and

¹ *Systematic Zoölogy: Its Progress and Purposes*, sep., pp. 20-21.

attention to the biographical or personal side of science; in nomenclature, rigid adherence to the law of priority, the one letter rule (thereby preserving names otherwise considered preoccupied), the coining of new names on classical models, and the avoidance of hybrid names and other etymological monstrosities; in taxonomy, exactness in definition of terms, attention to the relationships of higher groups, and standardization of the divisions of birds to make them comparable in rank with those of other classes of vertebrates. The value of his suggestions regarding publication of an annual list of additions to the Check-List and 'generalized' life histories of birds should not be lost sight of. While his sample biography of the Osprey can hardly be considered altogether successful, even from the standpoint of the author, the idea of basing the life history of a species on the accounts of a number of observers to eliminate errors due to individuality and personal equation is certainly worthy of thorough trial before being rejected or forgotten. He was especially well qualified to estimate the value of the work of others in systematic zoölogy and his criticisms, while frank and by some considered severe, were always made in a kindly spirit.

Gill was unmarried, possessed of ample means and thus able to devote his time and energies to whatever his fancy dictated. But, although he worked steadily and produced a large number of papers, he lacked the energy or concentration necessary for undertaking any great work. He was genial and social by nature, but his pleasures were comparatively few and simple. He had only a passive interest in outdoor sports and took little active exercise. He found his chief recreation as well as work in books, and he spent many hours every day in reading and writing. The morning hours and early afternoons were spent in the Smithsonian library looking over the new periodicals and keeping in touch with recent discoveries, the later part of the afternoons were devoted to the preparation of whatever papers he had in hand, and the evenings to reading. While truly a master of taxonomy, especially in the marshaling of zoölogical facts, he lacked a corresponding efficiency in handling his tools and the gradually increasing accumulation of books and papers sometimes almost forced him from his desk or from the room which he occupied as a study in the Smithsonian building. Even the master key of his own mind was impotent

at times to locate a certain book or paper which he had laid aside a few weeks before.

The last years of his life were quiet and uneventful. Three or four years before his death he suffered a severe paralytic stroke from which he never fully recovered. His cheerfulness and good spirits remained to the last but his strength gradually ebbed away until he found difficulty in getting about. In September, 1914, he moved out to the suburbs to spend the winter with his brother Herbert A. Gill, and a few days later was confined to his bed. On the morning of the 25th he was apparently as bright as usual, and after breakfast asked for the news of the day especially of the war which he followed carefully — but before noon he passed away suddenly.

In the death of Doctor Gill the American Ornithologists' Union has sustained a great loss, not merely in the absence of his genial personality and the kindly suggestions and criticisms on various knotty questions of nomenclature and bibliography, but chiefly in the lost opportunity which can never be regained of utilizing his broad knowledge and unsurpassed judgment in matters of taxonomy. In that great and pressing problem which has been carefully avoided for three decades but which cannot be ignored much longer — the revision of the classification of North American birds — Gill's intimate knowledge of other groups would have been invaluable. His broad views would have acted as a balance wheel on the ideas of some of the specialists in speciation who in their enthusiasm for minute differences are apt to throw the classification of birds out of gear in its relation to the taxonomy of other classes. No one in this country or generation was better able to appreciate the true value of the higher groups or to coordinate the families, suborders and orders of birds with the corresponding divisions of mammals, fishes or mollusks. Without some such standardization of groups we shall never attain a really satisfactory and permanent basis of classification.

THE MORE NORTHERN SPECIES OF THE GENUS
*SCYTALOPUS GOULD*¹BY FRANK M. CHAPMAN²

The species of the genus *Scytalopus* are small, black, slaty or brownish wren-like birds of mouse-like habits. Most of them live in dense undergrowth or fallen tree-tops in the forests of the Subtropical and Temperate Zones of the Andes where haunt, habit, color and size make them exceedingly inconspicuous in life and all but invisible in death.

At best they can be seen only when one is within a comparatively few yards of them, and the collector who is not properly equipped with a small gauge gun or auxiliary barrel blows into fragments more specimens than he secures.

Even after a successful shot in the luxuriant, dark, cloud forest of the Subtropical Zone it usually requires the most minute, painstaking search, guided by mark of shot here and a stray feather there, to find the fallen bird; while in the more open Temperate Zone forests I have had a specimen slip from my hand to be hopelessly lost in the mass of fallen limbs and undergrowth which, in places, like mossgrown brush-heaps, accumulate beneath the trees.

The native collector, armed with blow-gun, such as many of them in the Bogotá region of Colombia still use, gets comparatively few specimens of birds as difficult to collect as *Scytalopus*.

For these reasons, rather than because of the rarity of the birds themselves, most of the species of *Scytalopus* have been but poorly represented in our collections. In our work in Colombia and the adjoining countries we have therefore devoted especial attention

¹ This is the fifth paper based chiefly on collections made in Colombia from 1911 to 1915 by expeditions from the American Museum. The four preceding papers were all published in the 'Bulletin' of the Museum as follows: (1) Diagnoses of Apparently New Colombian Birds, XXXI, 1912, pp. 139-166. (2) Diagnoses of Apparently New Colombian Birds, II, XXXIII, 1914, pp. 167-192. (3) Diagnoses of Apparently New Colombian Birds, III, XXXIII, 1914, pp. 603-637. (4) Descriptions of Proposed New Birds from Central and South America. XXXIV, 1915, pp. 363-388.

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² Curator of Ornithology in the American Museum of Natural History.

to birds like *Scytalopus*, not only because of their rarity in collections, but because such birds, as a rule, show a greater tendency to respond to the influences of their environment than do less sedentary species.

Of *Scytalopus* alone we have thus taken in Colombia eighty-two specimens, doubtless a greater number than heretofore has been known from that country. Of *Scytalopus micropterus micropterus* Scl., for example, the British Museum contained but four specimens when Selater published his monograph of this genus. Prior to our work in Colombia the American Museum contained but one specimen of this species, and at the present time the Museum of Comparative Zoölogy contains but two, making a total of seven specimens for three large Museums.

In view of these facts one might well believe that *Scytalopus micropterus* was a rare species, but without making a greater effort to secure this bird than any other of similar habits, we have nevertheless obtained a series of twenty-four specimens. This includes both juvenal and adult plumages and, for the first time, enables one to determine that the silvery-white crown-patch, which is so striking a feature of some specimens, is purely individual and is not associated with either age or sex.

I give these figures for what I believe to be their significance, as in a general way they indicate how much field-work we still have to do before our collections of South American birds approach anything like completeness, rather than for their restricted application to the case in point.

Without attempting a revision of the entire genus, for which indeed adequate material does not yet exist in Museums, I give below the results reached in preparing a report on our Colombian specimens for inclusion in a paper on the distribution of bird-life in that country now in course of preparation.

In addition to the eighty-two Colombian specimens mentioned, W. B. Richardson has recently collected for us seven specimens in Ecuador, and Anthony and Ball, in April last, collected ten specimens of a most interesting new species in eastern Panama.

Of high importance is a series of thirteen topotypical specimens of *S. magellanicus* (Gmel.) lately received by the Brewster-Sanford Collection from Beck, which in connection with a Chilean specimen

of *S. niger*, sent by the same collector, permits me satisfactorily to determine our large series of the last-named species.

An examination of Lafresnaye's "Bogota" types was of course indispensable in this connection. These Mr. Bangs has kindly loaned me as well as the twenty-one other specimens of the genus contained in the Museum of Comparative Zoölogy.

The results of my studies of all this material, in so far as they affect the status of the species found north of the equator, may be summarized as follows.

Scytalopus senilis (Lafr.) = *Myornis* (gen. nov.) *senilis* (Lafr.).

Scytalopus magellanicus Auct. nec Gmel. = *Scytalopus niger* Swains.

Scytalopus analis Auct. nec Lafr. = *Scytalopus micropterus* *micropterus* Scl.

Scytalopus analis (Lafr.) = *Triptorhinus paradoxus* Kittl.

Scytalopus latebricola Allen nec Bangs = *Scytalopus sanctaemartae* Chapm.

Scytalopus sylvestris Bangs nec Tacz. = *Scytalopus sanctaemartae* Chapm.

The following four species are described as new:

Scytalopus panamensis (Subtropical Zone, Tacarcuna, E. Panama).

Scytalopus canus (Temperate Zone, Paramillo, West Andes, Col.).

Scytalopus sanctaemartae (Subtropical Zone, Santa Marta Mts., Col.).

Scytalopus infasciatus (Temperate Zone, Eastern Andes, near Bogotá).

Since the status of all but two¹ of the species known from north of the equator is affected by this revision I have for the sake of completeness added notes on them.

In addition to the species herein treated the following species from south of the equator are currently recognized; but in view of our discoveries in Colombia, it seems probable that our knowledge of the forms of *Scytalopus* from south of that country is far from complete:

Scytalopus magellanicus (Gmel.). Falkland Islands, Cape Horn region and northward into Chile.

¹ *S. griseicollis* (Lafr.); *S. argentifrons* Ridgw.

Scytalopus magellanicus [= *niger?*] *grandis* Cory. N. Peru, about thirty miles N. E. of Chachapoyas.

Scytalopus unicolor Salv. Cajabamba, Peru.

Scytalopus obscurus (King). Southern Chile.

Scytalopus acutirostris (Tsch.). Peru.

Scytalopus macropus Berl. & Stolz. Maraynioc, Cen. Peru.

Scytalopus micropterus bolivianus (Allen). Southern Peru; Bolivia.

Scytalopus speluncae (Menetr.). Southeastern Brazil.

Scytalopus indigoticus (Wied). Southeastern Brazil.

Scytalopus superciliaris Cab. Sierra of Tucuman, western Argentina.

It will be seen that with the exception of *Scytalopus indigoticus* and *S. speluncae*, all the known species are confined to the Andes, or, south of Bolivia, to the country at their base.

Such information as I can gather concerning these two species of eastern Brazil, leads me to believe that they inhabit the mountains at some altitude, possibly above the upper limits of the Tropical Zone. However this may be, it appears that of the species which are found in various parts of western South America from Cape Horn to Costa Rica, not one inhabits the Tropical Zone. In Colombia this implies that *Scytalopus* is not found below an altitude of 4,000 feet, and, as a matter of fact, only three of our specimens were taken below this level.

From the lower limits of the Subtropical Zone we have found *Scytalopus* in Colombia as high as 12,700 feet and consequently in the Paramo or Alpine Zone. Each species has its center of abundance in a certain Zone but where local conditions cause the overlapping or inosculation of zonal boundaries so do the ranges of their characteristic species overlap and inoscultate.

Thus, although *S. m. micropterus* is characteristic of the Subtropical Zone, we have two specimens from an altitude of 10,000 feet in the Temperate Zone. On the other hand, *S. niger* is a Temperate Zone species but occurs also in the upper part of the Subtropical Zone at an altitude of from 8,000 to 8,500 feet. The Temperate Zone is indeed the center of abundance of the genus and, in Colombia, only *S. m. micropterus* and its representative *S. sanctaemartae* range much below it.

At what latitude, south of the equator, this zone reaches sea-level and brings with it other forms which, like *Scytalopus*, have evidently extended their range northward as far as the South Temperate Zone itself, is one of the points an American Museum Expedition under the charge of Mr. Leo E. Miller is now trying to determine.

We know, however, that at least from central Chile southward to Cape Horn, *Scytalopus* lives at sea-level; and doubtless not far north of 30° S. latitude, it begins to ascend the mountains with the zone to which it is so largely restricted.

Since we cannot well believe that so ancient a type as *Scytalopus* can have its center of dispersal in the Temperate Zone of mountains so geologically recent as the Andes, we conclude that *Scytalopus* originated at sea-level and, consequently, south of 30° S. latitude.

The presence of species of this genus in southeastern Brazil, which are apparently separated by a wide area from the species found nearest to them in western South America, is a problem, which in the present stage of our knowledge, I confess I am not prepared to attack.

I append now my notes on the species studied, after first removing from *Scytalopus* the species heretofore known as *Scytalopus senilis* (Lafr.) for which I propose the genus

Myornis gen. nov.

Char. gen.—Resembling *Scytalopus* Gould (type *S. magellanicus* (Gm.)), but mesorhinium laterally compressed and elevated into a thin blade-like ridge which is highest above the posterior margin of the nasal operculum whence it descends toward both the tip and the base of the bill; tail longer, instead of decidedly shorter than wing; wing more rounded, the fourth to eighth, instead of third to seventh primaries (from without) subequal, the second about as long as the inner secondary instead of as long as the eighth primary.

Type.—*Scytalopus senilis* (Lafr.) = *Merul [axis] senilis* Lafr. Rev. Zool. 1840, p. 103 ("Bogotá"); type examined.

Range.—Temperate and Alpine Zones of the Andes of Ecuador and the Central and Eastern Andes of Colombia.

Remarks.—The species heretofore known as *Scytalopus senilis* (Lafr.) is obviously not congeneric with *Scytalopus magellanicus* (Gmel.), the type of the genus *Scytalopus* Gould, or with any other species of the genus known to me. Its laterally compressed and

elevated, angular mesorhinium is shown in a slight degree by *S. sylvestris* and more pronouncedly by *S. latebricola*, but its rounded wings in connection with its lengthened tail is a feature not possessed by any species of *Scytalopus* and it is this combination of characters of bill, wings, and tail which appears to warrant its generic distinction.

Lafresnaye's description (l. c.) of this species as "fronte et aliquot alae tectricibus albis" is explained by the fact that this type, loaned me by Mr. Bangs, is albinistic, the forehead, loral region, three greater coverts in one wing and two in the other, being white. The culmen is less elevated basally and less laterally compressed than in a specimen from El Piñon, but this is doubtless an indication of immaturity.

Specimens examined. — Ecuador; Mt. Piñchincha, 1; Colombia; "Bogota," (type of *Merulaxis senilis* Lafr.) 1; El Piñon, 1; Laguneta, 2.

Scytalopus niger (Swains.).

Platyurus niger Swains. Anim. in Menag. 1838, p. 323 (Chile).

Scytalopus magellanicus Auct. (Peru, Ecuador and Colombia records only).

Range. — Western South America from Chile, north, chiefly through the Temperate Zone, to Colombia.

Remarks. — In Colombia this is the most common species of the genus. It is found in all three ranges of the Andes where it is restricted in the main, to the Temperate Zone. Local conditions bring it down occasionally to the zone below. There is some variation in size and intensity of color in our series but it appears to be individual, and on the whole our specimens agree with one from Valparaiso, Chile. The juvenal plumage is more or less washed with rusty, paler below, and is never as distinctly barred as in *S. cinereicollis* and *S. micropterus*, the bars when present being comparatively obsolete. There is no indication of bars in the tail or of white in the crown.

This widely distributed species has been generally confused with *Scytalopus magellanicus* (Gmel.) which, as shown by thirteen specimens recently secured by Beck in the Cape Horn region for the Brewster-Sanford collection, is a wholly different species,¹ which has the forehead gray, the rest of the upperparts washed with cin-

¹ Cf. Menegaux and Hellmayr (Bull. Mus. d'Hist. Nat. 1905, p. 379) who have already reached a similar conclusion.

namon-brown, the back with subterminal black bars. The wings, except in very worn plumage, are externally edged with a lighter brown than the back, and at least the inner feathers are barred. The rectrices are more or less barred in all but two of these thirteen specimens. The underparts are grayish, of about the same shade as in *Myornis senilis* and the flanks, ventral region, and under tail-coverts are barred with black and ochraceous-buff or ochraceous-tawny.¹ The feet in life are marked as "brown," "brownish" or "yellowish" and in dried skins resemble those of *S. griseicollis* in similar condition.

All these specimens appear to be adult, but four lack the slight trace of silvery white in the crown, while the remaining nine show this mark in varying degrees. Possibly, as in *S. micropterus*, this character is individual.

Instead, therefore, of being a representative of the black, uniformly colored bird to which the name *magellanicus* has by most authors hitherto been misapplied, it is evident that this southern form is more closely related to *S. sylvestris*.

Specimens examined.—Chile: Valparaiso, 1. Ecuador: Zaruma, 2; Gualea, 1; Mt. Pichincha, 3. Colombia: Andes, W. of Popayan (alt. 10,340 ft.), 8; Cerro Munchique, 9; Cocal, 3; Almaguer, 4; Valle de las Pappas, 3; Laguneta, 3; Santa Isabel, 2; Sta. Elena, 1; Fusagasugá, 1; El Roble, 2; El Piñon, 2.

Scytalopus canus sp. nov.

Char. sp.—With a general resemblance to *S. niger* (Swains.)² but adult grayer throughout, the underparts paler than the upperparts, the center of the abdomen grayer than surrounding parts; tail shorter, the feathers narrower and softer, their barbs, apically, more or less separated; bill shorter, feet and tarsi more slender; apparently closely resembling, and perhaps representing, *S. unicolor* Salv. of Peru, but much smaller, the female of the same color as the male.

The juvenal plumage is evidently conspicuously barred above and below with cinnamon-buff and therefore resembles that of *S. griseicollis* rather than that of *S. niger*.

Type.—No. 133361, Am. Mus. Nat. Hist. ♂ ad. Paramillo (alt. 12,500 ft.), W. Andes, Antioquia, Col. Jan. 26, 1915; Miller & Boyle.

Range.—Known only from the type-locality.

¹ The color terms used in this paper will be found figured in Ridgway's 'Color Standards and Nomenclature.' Washington. 1912.

² = *S. magellanicus* auct. plur. nec. Gmel., excl. more southern references.

Description of Adult Male.—Uppertars, wings, and tail clear, dark neutral gray without trace of white on the head or of brownish wash on the back; underparts slightly paler, deep neutral gray the under wing-coverts and center of the abdomen with a trace of whitish; feet (skin) blackish or brownish black; maxilla black, mandible brownish black.

Adult Female.—Resembles the male.

Juvenal.—A male taken at the type-locality Jan. 26, 1915, has nearly acquired the plumage of the adult but still possesses in the crown, nape, scapulars, throat, abdomen, flanks, wing-coverts, tertials and tail, feathers which are barred with cinnamon-buff and black.

Remarks.—Miller and Boyle secured an excellent series of ten specimens of this species in that elevated region near the northern end of the Western Andes known as the Paramillo. In general coloration it resembles *Myornis senilis* with which, however, it has no close relation. Although approaching in size and superficially resembling *Scytalopus niger* (Swains.), the more loosely constructed remiges and differences in the color of the young indicate that it is not a representative of that species.

I have seen no specimens of the Peruvian *S. unicolor*, but from Salvin's description of it (Nov. Zoöl. II, 1895, p. 15) I conclude that *canus* resembles it in color but is smaller. Possibly *canus* is a representative race of *unicolor*, though as yet no form of either has been recorded from between northern Peru and northern Colombia. If this assumption of relationships be true the case is paralleled both in characters and distribution by that of *Diglossa brunneiventris* in which true *brunneiventris* is known only from Peru, while a smaller race is known only from Colombia. Indeed we have found it only on the Paramillo with *Scytalopus canus*.

Measurements of *S. unicolor* and *S. canus* are given below. Salvin's description of the female of *unicolor* is probably based on an immature bird. The "*S. magellanicus*" to which he refers is doubtless *Scytalopus niger* (Swains.).

						<i>Bill from</i>
	<i>Sex</i>	<i>Wing</i>	<i>Tail</i>	<i>Tarsus</i>	<i>rictus</i>	
<i>Scytalopus unicolor</i> ¹	?	59.6	40.6	21.5	15.2	
" <i>canus</i>	♂	50	35	23	13	
" "	♂	55	35	23	13	
" "	♀	52	35	22	13.5	
" "	♀	52	34	23	13	

Specimens examined.—Colombia: Paramillo, W. Andes, 10.

¹ Ex. Salvin.

Scytalopus griseicollis (Lafr.)

Merul [axis] grisei-collis Lafr., Rev. Zoöl., 1840, p. 103 (Bogotá); type examined.

Merul [axis] squamiger Lafr., Rev. Zoöl., 1840, p. 103 (Bogotá); Juv.; type examined.

Range.—Temperate Zone of the Eastern Andes of Colombia (and north-eastward to the Sierra of Merida, Venezuela?).

Remarks.—Found by us only in the Temperate Zone of the Eastern Andes near Bogotá. Examination of the type of Lafresnaye's *Merulaxis squamiger* shows it to be based on the juvenal plumage of this species. Mr. Bangs sends me, in addition to the types of *griseicollis* and *squamiger* a Lafresnaye specimen (No. 4854) labelled "Scytalopus erythropterus Lafr." I cannot find that this name was published. The bird is a not fully adult specimen of *Scytalopus griseicollis*.

The whitish abdomen, unbarred tawny flanks and rump, and brownish tail, distinguish the adult of this species. The juvenal plumage is conspicuously and evenly barred both below and above.

Specimens examined.—Colombia: 'Bogotá' (including the type), 7; El Roble (8,000 ft.), 1; El Piñon, 2; Chipaque, 1; Tocaimito (above Bogotá, 10,500 ft.), 3.

Scytalopus infasciatus sp. nov.

Char. sp.—In general color resembling *Scytalopus micropterus micropodus* Scl. (= *S. analis* Auct. nec Lafr.) but somewhat paler, the tail brownish, the rump and flanks tawny, unbarred as in *S. griseicollis* Lafr., bill black as in *micropterus*.

Type.—No. 132328, American Museum of Natural History. Paramo de Beltran (alt. 9750 ft.) near Bogotá, Colombia, Mch. 31, 1915, Hermano Apolinar Maria.

Range.—Known only from the Andes near Bogotá at altitudes of 8,000 and 9,750 ft.

Description of Type.—Upperparts dark neutral gray, the crown anteriorly, in some lights, rather more silvery but with no indication of a white patch, forehead and orbital region more dusky, back very slightly tinged with olive-brown, rump and upper tail-coverts tawny or ochraceous-tawny, unbarred; tail dark Prout's brown; wings fuscous, externally Prout's brown; underparts slightly paler than the back, abdomen without

trace of white; flanks and under tail-coverts bright ochraceous-tawny or ochraceous-orange, unbarred; feet brownish; bill black; the mandible, except on its rami, as dark as the maxilla; wing, 58; tail, 39; tarsus, 24; culmen, 11.5.

Remarks. — This species, which further illustrates the apparent exhaustlessness of the Bogotá region as well as of the genus *Scytalopus*, is based on a specimen presented to the American Museum by Hermano Apolinar Maria, the eminently efficient Director of the Instituto de la Salle in Bogotá.

Comparison with our large series of all the other known Colombian forms of *Scytalopus* leaves no doubt in my mind of its specific distinctness.

In the species possessing barred flanks in the adult this character is very constant. For example, not one of a series of twenty-five specimens of *S. micropterus*, including juvenal, immature, and adult plumages is without conspicuous bars in this region. On the other hand, not one of four adult specimens of *S. griseicollis* has the flanks barred. The absence of bars on flanks and rump, upper and under tail-coverts is therefore significant. Of the Colombian species which have these parts tawny, *S. griseicollis* has heretofore been the only one known without bars. Although *S. infasciatus* agrees with *griseicollis* in this important respect, the specific distinctness of the two birds is indicated by their differences in color, *griseicollis* being much paler with a whitish abdomen, and by the fact that both are found in the Temperate Zone of the same range.

Scytalopus infasciatus however, evidently ranges downward to the upper parts of the Subtropical Zone since a specimen from El Roble (altitude 8,000 ft.) above Fusugasuga, is apparently to be referred to this species. It differs from the type in having some indication of bars in the flanks, a fact which I take to indicate immaturity. Not dissimilar markings are shown by immature specimens of *S. griseicollis*, a species to which *infasciatus* is so nearly related that it is probable that in juvenal plumage *infasciatus*, as well as *griseicollis*, is barred. This El Roble specimen has a close superficial resemblance to *S. micropterus*, but its much more slender bill, agreeing in size with that of *griseicollis*, distinguishes it.

Specimens examined. — Colombia: Paramo de Beltran, 1; El Roble, 1.

Scytalopus sylvestris Tacz.

Scytalopus sylvestris Tacz. P. Z. S., 1874, p. 138 (Pallaypampa, cen. Peru).

Range.—Peru northward to the Temperate and Alpine Zones of the Central (and Eastern?) Andes of Colombia and northeastward to the Sierra of Merida, Venezuela.

Remarks.—I refer to this species, of which I have seen no authentic specimens, an adult female from the Paramo of Santa Isabel, in the Central Andes. It has the forehead grayish, the rest of the upperparts somewhat light mummy-brown, the feathers of the back narrowly margined with black; the tail is somewhat brownish than the back; the underparts are deep neutral gray; the flanks, ventral region, and under tail-coverts barred with black and ochraceous-tawny. A young male from the same locality is passing from juvenal into adult plumage. It resembles the adult but has more barred feathers in wings and on the nape, and the three remaining tail-feathers of the juvenal plumage are distinctly barred with black and ochraceous-tawny.

To this species I also refer four specimens taken in the Temperate Zone of the Andes of Merida, Venezuela. They have the flanks paler, abdomen whiter, tail and upperparts blacker, but these differences are at best racial and probably only individual.

A Venezuelan specimen in molt has enough of the postjuvenile plumage remaining to show that it is distinctly barred with ochraceous-tawny above as well as below.

Possibly our birds may not be true *Scytalopus sylvestris* but they agree too closely with Taczanowski's description of that species to warrant separation from it without comparison with Peruvian specimens.

Although this species more nearly resembles *S. magellanicus* (Gmel.) than does any of the other species here considered, it is not clear whether it is a representative of that species.

Specimens examined.—Colombia: Paramo of Santa Isabel, 2; Venezuela; Paramo de Conejos, Sierra of Merida, 4.

Scytalopus latebricola Bangs.

Scytalopus latebricola Bangs, Proc. Biol. Soc. Wash. XIII, 1899, p. 101 (Paramo da Chiruqua, Col.).

Range.—Colombia; Alpine Zone of the Santa Marta Mts.

This a strongly marked species of the Alpine Zone of the Santa Marta group known only from the specimens collected by W. W. Brown for E. A. and O. Bangs. Thanks to Mr. Outram Bangs I have examined six of these, including the type. In general color this species resembles *S. griseicollis* (Lafr.) but it is darker below and the rump, flanks, upper and under tail-coverts are barred with black, though less distinctly than in any other of the northern species having bars on these parts.

The feet are heavier even than in *S. micropterus*, and the bill is more laterally compressed, deeper at the base with the culmen more ridged and elevated than in any other species of the genus known to me. The bill thus approaches in form that of *Myornis senilis* but the tail is short as in *Scytalopus*.

Possibly *S. latebricola* represents the species to which I have applied the name of *S. sylvestris* Tacz; but it is much larger than that species and, aside from the differences in the shape of the bill (*sylvestris* having a bill like that of *griseicollis*), *sylvestris* appears always to have the back dark olive-brown, whereas in the adult of *S. latebricola* it is deep mouse-gray.

Specimens examined. — Colombia: Paramo de Chiruqua, 4; Paramo de Macotama, 2.

Scytalopus micropterus micropterus Scl.

Scytalopus micropterus Scl., P. Z. S., 1858, p. 69 (Napo, Ecuador).

Scytalopus analis Auct. (not of Lafr. = *Triptorhinus paradoxus* Kittl.; type examined).

Range. — Subtropical Zone in Ecuador and Colombia.

Not uncommon in the denser low growth of the heavy forests of the Subtropical Zone of all three ranges and occasionally extending upward to the lower border of the Temperate Zone and rarely downward to the Tropical Zone. All our twenty-four specimens have the flanks, lower abdomen, rump and upper tail-coverts barred with rusty and black. The white crown-patch appears to be a purely individual character not dependent upon age, sex, season or locality. It is well developed in some immature specimens and wanting in others, is present or absent in both sexes, and in specimens from the same locality. Nine specimens possess it to a greater or less degree, fifteen are without it.

On examination of Lafresnaye's type of "*Mer [ulaxis] analis*" (Rev. Zoöl., 1840, p. 104) loaned me by Mr. Bangs, I find it to be an adult specimen of *Triptorhinus paradoxus* Kittl., a fact confirming Lafresnaye's belief (*l. c.*) that his specimen came from "Paraguay ou du Chili." Kittlitz's name has nine years priority and Lafresnaye's consequently becomes a pure synonym of it.

The bird hitherto known as *Scytalopus analis* (Lafr.) will apparently therefore become *Scytalopus micropterus* Sel., as above. I have seen no Napo specimens but our collection contains a Bogotá skin labelled by Selater "*Agathopus micropterus*." The generic name he subsequently abandoned.

Scytalopus micropterus bolivianus (Allen), of which I have the type and a specimen from Inca Mine, differs from Colombian specimens only in being smaller, the tail, especially, being shorter. Measurements are appended:

	Locality	Sex	Wing	Tail	Tarsus	Cul	Ex.
<i>S. m. bolivianus</i> (Type)	Rfeyes, Bol.	?	53	33	22	13	
"	Inca Mine, Peru	♂	51	33	23	12	
<i>S. m. micropterus</i>	Buena Vista, Col.	♂	57	44	25	13.5	
"	El Eden	♂	63	45	24	13.5	
"	Salento	♂	62	44	25	13.5	
"	Miraflores	♂	59	42	24	13.5	

Specimens examined. — Colombia: Alto Bonito, 2; Las Lomitas, 1; San Antonio, 1; Pavas, 1; Andes W. of Popayan (10,340 ft.), 1; Ricaurte, 1; Miraflores, 2; Salento, 3; Laguneta, 1; El Eden, 2; La Palma, 3; La Candela, 2; Andalucia (3,000 ft.), 1; Bogotá, 2; Buena Vista, 1.

Scytalopus sanctæ-martæ sp. nov.

Scytalopus sylvestris Bangs (nec Tacz.) Proc. Biol. Soc. Wash. XIII, 1899, p. 101, (San Francisco, Santa Marta).

Scytalopus latebricola Allen (nec Bangs) Bull. A. M. N. H., XIII, 1900, p. 162, (Valparaiso, Santa Marta).

Char. sp. — Most nearly related to *Scytalopus m. micropterus* Sel., the center of the crown, in some specimens, with a silvery white spot; but size much smaller, general color grayer, the tail brownish.

Type. — No. 72893. American Museum of Natural History. ♂ ad.

Valparaiso (alt. 4,500-5,500 ft.) Santa Marta Mts., Col., June 9, 1899, G. H. Hull.

Range.—Subtropical Zone, Santa Marta Mts., Colombia; Andes of Merida, Venezuela.

Description of Type.—Upperparts deep, neutral gray; forehead and orbital region black; crown with a silvery white patch slightly mixed with gray; rump cinnamon-brown, the feathers terminally barred with black and ochraceous-tawny; upper tail-coverts similar in color but less distinctly barred; tail Prout's brown, more fuscous toward the shaft; wings much like the back, more or less margined externally with the color of the tail; underparts paler than the back, neutral gray, the abdominal region centrally whitish; the flanks and under tail-coverts barred with black and bright cinnamon-brown or ochraceous-tawny; feet (skin) brownish; bill black, gony's brownish. Wing, 51; tail, 33; tarsus, 20; culmen, 13 mm. (A second male is without a tail, but, in other respects, including the white crown-patch, agrees with the type.)

Juvenal Plumage.—With a general resemblance in pattern to the same plumage of *S. micropterus*, but everywhere paler; upperparts Prout's brown; crown slightly darker; the feathers very narrowly margined with black; loral and ante-orbital region ochraceous-buff; rump not sharply barred with black and ochraceous-tawny; tail, lacking; wings externally much like the back, the coverts terminally barred with black and ochraceous-tawny; underparts rather uniformly barred with ochraceous-buff and black; the bars on the flanks deeper, more transverse, less lunular. (Described from No. 97940 American Museum of Natural History, Valparaiso, Col., taken from the nest, June 30, 1899.)

Postjuvenal Plumage.—Similar to that of the adult but upperparts between Prout's brown and mummy-brown.

Remarks.—In the light of our large series of this group it appears that the three Santa Marta specimens of *Scytalopus* referred by Dr. Allen (*l. c.*) to *S. latebricola* Bangs, and the one immature specimen provisionally identified by Bangs, as *S. sylvestris* Tacz. are representatives of *S. micropterus micropterus* ScL.

The presence in both our adult specimens of the white crown-patch, which is often, but not always, found in *S. micropterus*, and so far as I am aware, in no other species of the genus, betrays the relationships of *sanctæ-martæ* with the species. Furthermore, the juvenal plumage of *sanctæ-martæ* resembles in pattern that of *micropterus*. It is important to note that both species inhabit the Subtropical Zone.

Scytalopus latebricola, on the other hand occupies the Alpine Zone, and is a much larger bird than *sanctæ-martæ* (wing, 63 mm.)

with heavier feet and bill, the latter being much vertically compressed with the culmen sharply ridged and basally elevated, while in *sanctæ-martæ* as in *micropterus*, the bill is more subulate. The fact that in immature plumage both the species just named have the upperparts brown, doubtless misled Mr. Bangs in referring his immature specimen of *sanctæ-martæ* to *S. sylvestris*.

In the specimens which I identify as *sylvestris* the upperparts are brown in the adult and are of a distinctly different shade, olive-brown rather than mummy-brown or Prout's brown as in *sanctæ-martæ* or *micropterus*. An adult from the Subtropical Zone near Merida, Venezuela appears to be conspecific with this form.

Specimens examined.—Colombia: Valparaiso, 3; San Francisco, 1; Venezuela; Andes near Merida, (alt. 6,500 ft.), 1.

Scytalopus panamensis sp. nov.

Char. sp.—Most nearly related to *Scytalopus argentifrons* Ridgw., but forehead black like the crown; supra-ocular stripe whiter, broader, more pronounced; underparts, particularly throat, paler gray; size larger, bill longer and heavier.

Type.—No. 135591, American Museum of Natural History, ♂ ad. Tacarcuna (3,600 ft.), eastern Panama, March 6, 1915; H. E. Anthony and D. S. Ball.

Range.—Subtropical Zone of the Santa Espiritu Mts., eastern Panama.

Description of Male.—Entire crown and foreback slate-black, becoming dark mummy-brown on the lower back and brighter, more rusty on the rump and upper tail-coverts, which are barred with black; a broad, sharply defined silvery-white line passes over the eye from above the front of the orbit to the nape and is separated from the auriculars by a slaty-black post-ocular stripe; auriculars somewhat grayer; lores dusky; orbital ring blackish; tail blackish with a slight tinge of brown; wings slaty-black with a slight trace of mummy-brown in the outer margins of quills and coverts increasing in amount internally; throat and rest of underparts centrally, pale neutral gray; the sides darker; the flanks, ventral region and under tail-coverts distinctly barred with black and bright tawny or ochraceous-tawny; feet (skin) brownish black; bill black.

Female.—Similar to the male, the superciliary stripe less bright and not so pronounced; the upperparts washed with mummy-brown.

Remarks.—This is one of the most interesting species secured by our recent expedition to the mountains of eastern Panama. Ten specimens, six males and four females, all apparently adult, were

taken on Mt. Tacarcuna at altitudes from approximately 3,600 to 4,600 ft.

In the Subtropical Zone of the mountains of western Panama and Costa Rica, *Scytalopus panamensis* is obviously represented by the nearly related *S. argentifrons* and the discovery of this new form, makes less inexplicable the occurrence of a species of this genus in a region so far removed from the nearest point at which other species were known to occur. The bearing of this discovery on the faunal affinity of the Subtropical Zones of Costa Rica and western Panama with those of eastern Panama and Colombia is obvious but the subject is too wide to be discussed in this connection.

Specimens examined.—Mt. Tacarcuna, eastern Panama, 10.

Scytalopus argentifrons Ridgw.

Scytalopus argentifrons Ridgw., Pr. U. S. N. M. xiv., 1891, p. 475 (Volcan de Range-Irazú, Costa Rica).

This, the most northern species of the genus, is clearly a representative form of *S. panamensis* from which it is now specifically distinct. It is confined chiefly to the Subtropical Zone in Costa Rica and western Panama, ranging in the first-named country, according to Carriker, from 4,000 ft. to timber line, and in western Panama Bangs records it from 5,000 to 7,000 ft.

Specimens from Boquete and Mt. Chiriquí, when compared with those from Irazú show, in their larger bill and somewhat less silvery forehead, a slight but unmistakable approach toward *panamensis*. This variation is obvious enough in comparison of specimens but it is too slight to be defined by words or in figures.

The female of *argentifrons* apparently lacks the silvery front and superciliaries which distinguish the male and thus closely resembles the female of *S. micropterus*, a fact which indicates its descent from that species. The female of *panamensis* on the other hand, possesses (though in a somewhat less conspicuous form) the white superciliaries of the male, and thus bears less resemblance to the female of *micropterus* than does the female of *argentifrons*, though geographically nearer to it.

Specimens examined.—Costa Rica: Irazu, 6; Panama: Boquete, 4; Mt. Chiriquí, 2.

KEY TO ADULTS OF THE SPECIES OF *Scytalopus* FOUND NORTH OF THE EQUATOR.

1. Plumage uniform.
 - a. Blackish, not perceptibly paler below than above. *S. niger*.
 - b. Grayish, perceptibly paler below than above. *S. canus*.
2. Plumage not uniform.
 - A. Flanks tawny, barred.
 - a. A silvery or white superciliary.
 - a.¹ Superciliary and forehead silvery. *S. argentifrons*, ♂.
 - a.² Superciliary white, forehead blackish like the crown. *S. panamensis*.
 - b. Without a superciliary.
 - b.¹ Back gray.
 - b.² Size small, wing under 55 mm. *S. sanctæ-martæ*.
 - b.² Size larger; wing over 58 mm.
 - c.³ Underparts dark slaty, flanks sharply and distinctly barred; bill not deeper than wide at base. *S. m. micropterus*.
 - c.⁴ Underparts mouse-gray, flanks not sharply and distinctly barred; bill much deeper than wide at base. *S. latebricola*.
 - c.¹ Back brown.
 - c.² Forehead neutral gray, tail olive-brownish. *S. sylvestris*.
 - c.² Forehead and tail blackish.
 - d.³ Wing over 55 mm. *S. micropterus*, ♀.
 - d.⁴ Wing under 55 mm. *S. argentifrons*, ♀.
 - B. Flanks tawny, unbarred.
 - a. Paler, underparts light neutral gray. *S. griseicollis*.
 - b. Darker, underparts deep neutral gray. *S. infasciatus*.

SYNOPSIS OF THE CHARACTERS OF THE JUVENAL PLUMAGE IN CERTAIN SPECIES.

- A. Upperparts as well as underparts barred with ochraceous-tawny. *S. griseicollis*, *S. sylvestris*, *S. canus*.
- B. Upperparts dark mummy-brown narrowly margined, more rarely inconspicuously barred, with black; underparts widely margined with ochraceous-tawny or cinnamon-buff. *S. micropterus*, *S. sanctæ-martæ*, *S. argentifrons*.
- C. Plumage practically unbarred, or bars inconspicuous and restricted largely to flanks and upper-tail coverts, the underparts broadly margined with cinnamon-buff. *S. niger*.

Measurements.

Name	Locality	Sex	Wing	Tail	Tarsus	Culmen
<i>S. magellanicus</i>	Cape Horn region	♂	51	32	21	12
"	"	♂	51.5	33	21	12
"	"	♀	52	31	20	12
"	"	♀	51.5	31.5	21	12
<i>S. niger</i>	Valparaiso, Chile	♂	52.5	40.5	20	13
"	Santa Isabel, Col.	♂	55	42	23	13
"	El Roble "	♂	55.5	39	23.5	11
"	Sta. Elena "	♀	53	39	21	12.7
"	El Roble "	♀	55	39	23.5	13
<i>S. canus</i>	Paramillo, Col.	♂	55	35	23	12
"	" "	♂	50	35	23	12
"	" "	♀	52	35	22	12
"	" "	♀	52	34	23	11.5
<i>S. griseicollis</i>	El Piñon, "	♂	58	43.5	24	11.5
"	'Bogotá'	?	56	39	23	12
<i>S. infasciatus</i>	Paramo de Beltran, Col.	?	58	39	24	11.5
"	El Roble,	♀	57	41	23	11.5
<i>S. sylvestris</i>	Santa Isabel, "	♀	53	41	21	10.5
"	above Merida, Venezuela	♂	54	38	23	12
"	"	♂	52	39	23	12.5
<i>S. latebricola</i>	Paramo de Chiruqua, Col.	♀	63	42.5	26.5	15
"	" "	♀	63	42	26	15
<i>S.m.micropterus</i>	Buena Vista,	♂	57	44	25	13.5
"	Salento.	♂	62	44	25	13.5
"	San Antonio,	♀	57	42	23	13.5
"	La Candela	♀	59	45	21	13
<i>S. sanctæ-martæ</i>	Valparaiso,	♂	51	33	23	13
"	Merida, Venezuela	?	54	35	22.5	13
<i>S. panamensis</i>	Tacarcuna, Panama	♂	55.5	44	23	14
"	" "	♂	53	41	23.5	14
"	" "	♀	57	41	22	13
"	" "	♀	54	37	22	13
<i>S. argentifrons</i>	Irazu, Costa Rica	♂	53	44	22	12
"	Chiriqui, Panama	♂	53	43	22	13
"	Boquete, "	♀	51	41	20	13

THE PLUM ISLAND NIGHT HERONS.

BY S. WALDO BAILEY.

FOR a region which on casual or hasty observation appears to be barren and dreary, devoid of many of those features which go to make the attractive and picturesque in nature, I have found on intimate acquaintance, Plum Island lying off the northeast coast of Massachusetts, to be a most interesting and fruitful locality for study and research.

Separated from the mainland by a broad stretch of level marsh and several tidal creeks, on the north, the latter widening into a broad sound farther south, the island extends from the mouth of the Merrimac River on the north some nine miles southward to Ipswich River not far from the northerly base of Cape Ann, but averages scarcely half a mile in width.

Geologically it is a series of wave washed, wind blown sand dunes, overlaying by no great depth submerged drumlins, the inundation of these being due to the slow subsidence of the coast line since the glacial epoch. The dunes on the landward side are bordered by an irregular narrow strip of marsh, cut by numerous small intersecting ditches and sinuous tidal creeks. Bordering the mainland, broad stretches of marsh come down to meet these creeks. Nearly the whole of the marshy area is covered completely by every monthly high run of tides.

Thoreau writing of the region over sixty-five years ago described it as a place of "dreary bluffs of sand and valleys plowed by the wind, where you might expect to discover the bones of a caravan . . . probably Massachusetts does not furnish a more grand and dreary walk. On the sea side there are only a distant sail and a few coots to break the grand monotony. A solitary stake stuck up or a sharper sandhill than usual is remarkable as a landmark for miles; while for music you hear only the ceaseless sound of the surf and the dreary peep of the beach birds."

Conditions have changed but little since Thoreau's time. A small summer colony at the northern end of the Island connected with Newburyport by trolley, and a hotel and a few summer cot-

tages at the southern extremity or "Bluffs" add life and activity to these portions during a few months of the year, and a federal lighthouse and two life saving stations maintain a watchful eye seaward. But between these points of activity lie long stretches of bleak dunes and rolling ridges over which the winds of winter sweep with relentless fury blowing the looser particles of sand much in the manner of snow, cutting into, and altering somewhat the contour of the hillocks from year to year. And in midsummer the sun beats down with a torrid intenseness.

Occasionally among the wind swept hollows between the dunes one finds a rudely chipped implement or arrow head of flint (much polished and worn by the action of the sand) a silent reminder of the former wild inhabitants of the land. And like a hundred and one other places along the Atlantic coast, this place has its traditional buried treasure, left years ago by Capt. Kidd, and now only awaiting the search and industry of some keen prospector to bring it to light.

But bleak and desolate as the locality would seem, and at certain seasons is certainly, the land is not wholly barren. In many favored parts, sheltered from the force of the winds and shifting sands, nature attempts to cover the nakedness of the soil with a mantle of vegetation. The botanist may find much here of interest in his particular line of study, and a survey of the entire region would reward the student with a list of species quite respectable in numbers. On the tops and leeward sides of the dunes one finds the coarse beach grass, *Ammophila arenaria*, growing abundantly, its plump heads nodding before every breeze, and its long slender recurving leaves describing dainty arcs in the sand around their base.

And growing along in company with it but in lesser quantities is the beach pea, *Lathyrus maritimus*, the long deep roots of both these species acting beneficially as sand binders. Such coastwise species as the yellow-eyed grass, *Xyris flexuosa*, and the beach heather, *Hudsonia tomentosa*, find a congenial soil here, the last named, forming in places on the levels between the higher dunes, a pale green carpet to cover the brown of the sand, and in its season of bloom, further adds to the colored tapestry with a rich display of deep yellow. And so I might continue, and enumerate a long list of

herbaceous plants and come at length to the low shrubs like sweet fern, *Myrica asplenifolia*, and bayberry, *Myrica carolinensis*, both of which grow plentifully here. And too, the beach plum *Prunus maritima*, from which the Island receives its name, once growing here abundantly now nearly extirpated by the ravages of the brown-tail moth, *Euproctis chrysorrhoea*: and, varying from a low shrub, to a tree of from 15 to 25 feet in height, is the black cherry, *Prunus serotina*, growing abundantly in many places all along the Island.

On the landward or marsh side of the Island a variety of grasses may be found, many acres of which are harvested each year and fed to the stock on the adjacent inland farms. The low seaside gerardia, *Gerardia maritima*, and heathery marsh rosemary, *Limonium carolinianum*, and the less abundant, but showy Canadian burnet, *Sanguisorba canadensis*, all these and many more may be found scattered over the broad expanse of the marshes, both of the Island and mainland.

One is surprised too, at the number and considerable size of the trees that grow in certain of the deep bowl-like hollows between the dunes. There are a fair number of such species as poplar, *Populus tremuloides*; black oak, *Quercus velutina*; elm, *Ulmus americana*; tupelo, *Nyssa sylvatica*; red maple, *Acer rubrum*, and shad, *Amelanchier canadensis*, many of these in especially favored places attaining a height of 35 feet or over. Toward the southern end of the Island are a few thickets of grey birch, *Betula populifolia*, and scraggy wind distorted cedars, *Juniperus virginiana*. Not infrequently, in among the growths of trees the explorer encounters nearly impenetrable tangles of wild grape, *Vitis labrusca*; Virginia creeper, *Pedera quinquefolia*; cat brier, *Smilax rotundifolia*; and climbing bittersweet, *Celastrus scandens*. And poison ivy, *Rhus toxicodendron*, grows profusely over a wide area.

To the bird lover and the sportsman the Island and its adjacent marshes hold out several alluring invitations. It has been said, and with probable truth, that in years past, no place of equal extent on the Massachusetts coast has been a favorite resort for more wild fowl and shore birds. And up to the present time, considering the increasing persecution of these birds, fair flights of some of the species still continue, though in recent years owing probably to incessant murderous attacks made upon them, there has been,

apparently, a deflection in their line of flight, many flocks passing by altogether, well off shore.

For twenty-five or thirty years past (if the information given me by longshoremen and gunners long familiar with the region, is correct) up to 1909, a colony of Black-crowned Night Herons (*Nycticorax nycticorax nævius*) have nested on the Island. This colony I believe is one that about thirty years ago nested in a hemlock swamp not far back from the Merrimac River in the town of Amesbury. With the cutting off of the trees in this swamp and its surroundings the birds were driven from their favorite and probably long used breeding place here and resorted to the more secluded site the Island afforded. My acquaintance with these birds in this latter place began in 1904 when of a day's gunning on the marshes I wandered back among the dunes and by chance came upon the rookery. For the next five years my knowledge of them was gained by several visits made at irregular intervals, to the region, and for a description of these, I will, with a few corrections and omissions of unimportant details, quote briefly from my notes of those dates.

August 12, 1904 — To the Plum Island marshes, gunning. The weather cloudy, threatening rain: wind, moderate northeasterly . . . The most interesting happening of the day occurred when after tiring of gunning and tramping over the marshes, with indifferent success, I wandered back among the sand dunes toward the sea-shore near "Long Point" and in a deep, brushy, bowl-like depression between high dunes discovered a nesting colony of Black-crowned Night Herons. As a conservative estimate of the birds here, young and old, I placed the number at upward of 700. As there was more or less of activity and commotion among them and a continual passage of birds to and from the shore and at less regular intervals from the marshes, it was rather difficult to form an estimate. The number of nests served as a more reliable basis to judge upon. A somewhat hasty count of these resulted in 157, that I believed from appearances were, or had recently been, in use. Granting that there were two adults for each nest, and an average of three young (I believe the average would be higher than this), the total would not be far above the figure named.

I found a few young birds still in the nests but by far the larger

portion of them were able to fly. It is probable that the birds still in the nests were of a second brood, or their parents had been interrupted in their first attempts at nesting.

Guttural squawks and a ghoulish, uncanny, rasping din greeted me as I stood on the rim of the hollow and looked across the lively scene, voices that the ornithologist Wilson aptly likened to the noise made by several hundred Indians trying to choke each other! Descending into the brushy thickets, I found the place not a clean one to travel about in. Decidedly filthy in the vicinity of the nests, the trees and much of the foliage white with chalkings, and the ground beneath covered with refuse, the stench of which was keenly sensible to the olfactory nerves.

The nests were very loosely constructed, of coarse dead sticks, without any attempt at lining, apparently only thrown together and looking as if a good breeze would blow them out of the trees altogether. Some of the larger trees contained over a dozen nests each, these varying in situation from 6 to 25 feet above the ground, the ramshackle affairs built in almost every available crotch, often seemingly regardless, of the close proximity of a similar dwelling.

In moving about amid the tangle that composed the undergrowth of the place I was continually scaring up more birds for by no means had they all taken flight upon my first appearance, though the multitude that left at that time would seem to have emptied it. Sometimes, a dozen or twenty birds, chiefly adults, would take flight at once from a thicker covert, and after much flapping about and noisy, hoarse squawking become silent but sail steadily to and fro high over head, the younger birds taking refuge in the thickets of several nearby hollows among the dunes.

Some few of the young birds still on the nests, upon being disturbed at my approach or attempted investigation, would crawl out and climb clumsily about on the adjacent limbs, gawky, awkward, and scarce able to keep the balance requisite for maintaining their hold on the slender branches. Emerging on the farther side from any point of entrance, of the circular hollow, the whole area being only about two acres in extent, I caught glimpses of small groups of birds, the young and unsteady of wing, that had resorted to nearby cover. These callow birds were perched on the plum bushes or moving slowly about on the sand and doubtless

wondering what all the uproar was about. Their grayish brown coats contrasted rather markedly with the green of the foliage but against the duller tone of the sand, harmonized to a degree almost perfect until their presence was revealed by motion.

On the whole the hour spent here was a novel and interesting experience and I congratulated myself for chancing upon it, believing that an occasional visit to the place in the future, would offer an opportunity for varying my studies, previously confined, to the smaller land birds found near home.

My next visit to the locality was made the following spring, May 21, 1905, and recorded in my note-book somewhat as follows:—

“By trolley and afoot to Plum Island, down as far as ‘Long Point,’ to visit the heron rookery there. The day a fine mild, clear one with light northwesterly wind. Was accompanied on this trip by F. D. B. The object of our visit today was to secure a few sets of eggs for our collections and make a few observations on nesting habits in general. As we topped the steep sand hills and looked down on and across the wooded basin which the herons had chosen for a nesting place, one could not, even though he be of a reserved or nonchalant disposition, fail to be impressed with the lively scene there presented to view. Several hundred birds rose at our appearance on the rim of the hollow and with much flapping and wheeling about, voiced their resentment at our disturbance of their domestic peace, with discordant, raucous, guttural squawking, which was increased to a tumultuous din when we descended into the lower ground to the precincts of their nests. Through rank tangles of beach plum, black cherry, grape vine, catbrier and poison ivy, we pushed our way to the more open ground under some of the larger trees, in which many of the nests were to be found. The tangles were made much more disagreeable of penetration by chalkings and the stench of refuse underfoot, these further adding to the natural protection afforded by briars and the closely interlacing branches.

In trees of shad, poplar, maple and elm, the majority of the nests seemed to be placed, with fewer numbers in oak and tupelo. Positions varying in height, ranging from six to twenty-five or even thirty feet from the ground, available crotches, chiefly governing the choice of position. A few, probably a dozen, I noted, were

placed within a few feet only from the ground, several nearly or quite on it, but most of these were in such tangled thickets none but a weasel or winged enemy could gain access to them. The climbing of these trees was not a task for one considerate of clean clothes or sensitive nostrils for they were well white-washed, which served as a deterrent to any but the most enthusiastic. A few of the nests contained at this early date, downy young ten days or a fortnight old and the thin piping whistle-like voices of these helped to increase the uproar going on overhead among the adults. Many of the nests we visited contained sets of eggs well advanced in incubation. In fact the most of those that we saw were more or less advanced and it was only after considerable searching and difficulty that we were able to obtain a few comparatively fresh sets. As we visited several groups of trees, each containing numerous nests we had an opportunity to make note not only of the different stages of incubation but the various number of eggs making up a set. In three instances I saw nests containing only two eggs and these apparently were full sets in these cases for they were well along toward the time of hatching. In not a few other nests, three seemed to be the complement. But by far the greater number contained four and a few even five, the last named figure the highest I saw in any of them. The difference of time represented between fresh sets and the young birds of several days of age would go to show that there was considerable variation among the different pairs regarding the date of commencing household duties. A few pairs must take them up soon after their arrival in mid April; others in a more leisurely fashion as indicated by the fresher sets.

I took for my collection a few fresh sets of four and five, of the Night Herons, and a set of four of the Little Green Heron, *Butorides virescens virescens*, a nest of which I was fortunate in finding in a thicket of low bushes near the center of the hollow.

A few crows hovered around the margin of the woodland, and in several places I saw punctured, empty and broken egg shells which appeared not to have been broken after the usual manner of hatching, and from these evidences I suspected the cause of the crows neighborliness. Though in justice to the crow I would add, that it seemed not improbable that some eggs might be rolled out of the shallow nests, occasionally by the herons themselves in set-

ting on or on leaving the nests. Crow Blackbirds were in the vicinity in small numbers. Among the low growing beach plums and black cherry I found a few nests of these birds, containing sets of three and four eggs. Whether these birds take any part in nest robbing here in this locality I am from my limited observations in the region, not prepared to say; but my opinion, based on experience with them farther inland, leads me to think that they will do so on occasion. Numerous empty gun shells seen in the immediate vicinity of the rookery, and now and then the skeleton or dried remains of a heron on the ground or lodged among the branches, betokened a less excusable enemy. Some "sportsman" (so called, but spare the mark!) who thought it clever to keep in "good practise" by using these sluggish birds as a target.

The more strenuous labors of our visit being over, we secreted ourselves for a time in one of the thicker tangles and from there watched the colony settle down to a state of comparative tranquility again. The birds came readily enough back to their home trees, after our disturbance and the deserted nests soon contained their brooding birds again and the business of life in the rookery went on as usual. I was interested in noting in the cases of some of the nests we had just robbed, that the females settled broodily upon them again as though nothing had happened to their nursery treasures. So much for the power of instinct and habit perhaps!

There was more or less of activity at all times in the vicinity of the rookery; birds flying to and from their salvaging or feeding ground along the shore, or from the quest of food out on the marshes. The arriving birds settled with flapping of wings and awkward bobbings to preserve their balance, among the trees in proximity to their nests. The arrival or departure of a bird seemed to be the signal for additional squawking and outcry on the part of his fellows. There was seldom or never a full minute of quiet. The hungry young were already beginning to pipe their wants in weak falsetto or as in the case of the older chicks with a persistent and stronger "tek-tek-tek." Whether all the guttural and variously pitched squawking of their elders were uttered in response to the insistent demands of the youngsters, would be difficult for anyone unacquainted with heron language to determine, but certain it was there was no lack of clamor and raucous din, always augmented by

the arrival or departure of birds or by any change of position among those about the rookery.

Two or three birds were still engaged in nestbuilding, or rather the repairing of last year's nests. I saw one male heron come flying in from a neighboring thicket of trees with a fair sized dead stick in his beak, and this coarse building material he proceeded to work into the rude platform of similar timber. In another instance, close by our place of concealment I saw the skeleton of a young heron, victim of some disaster of the previous year, worked in as constructive material for the nest. Rather a gruesome reminder, close at hand, for the birds of the present season were they gifted with the powers of thought or reflection.

Our leave-taking and the two mile walk along the border of the marshes, back to the trolley line was considerably hastened by the vigorous assaults of swarms of bloodthirsty mosquitoes, who disregarded all but savage standards of warfare in their attacks. But altogether this visit to the rookery was a pleasant and instructive one, resulting in our gaining a fuller knowledge of the habits of these interesting birds."

In the season of 1906 I visited the rookery but once, and then late in August when the business of housekeeping for that season was pretty well over and the place chiefly used now as a kind of rendezvous or roosting place for such of the birds as had not scattered and wandered along the coast or inland in small family flocks or individually. From the time the young became steady of wing, up to the time of departure for the South, in late October or early November, according to the mildness or severity of the season, the birds are something of wanderers, drifting from one swamp or secluded river border to another, or along the marshes and tidal creeks of the coasts. At this season I have frequently found them along the borders of several of the larger sluggish streams and brooks inland, and about the shores of the smaller reedy ponds and watering holes. At dusk and during the early evening their uncanny "quawks" may be heard coming eerily from the gloom overhead, as they change from one tarrying place to another.

On June 9, 1907, I made a trip to Plum Island and attempted at this time to secure photographs of the herons at the "Long Point" rookery. For a camera I had a 4×5 Poco, with the usual

trade lens known as a "rapid rectilinear," a three speed shutter, and a few single plate holders together with other necessary accessories, such as tripod, thread auxiliary lenses, etc. Of the half dozen or more exposures made on this trip there were but one or two that proved successful, my failure due to a certain extent, to my inexperience in using a camera and also I might add, that in the light of the knowledge gained in recent years, of a camera and its management, due to inadequate equipment for the work in hand, a better lens and more rapid shutter being necessary for the making of good photos in this particular line of work.

The weather on this occasion was typical of the best in June, the morning a clear and bright one, with a light northwest wind blowing and a few low lying white-capped clouds in the west, prophetic of possible showers later in the day. In making the two mile tramp down the shore from the trolley line I found the beach much changed by the storms of the previous winter. Much of the sand along the upper end of the Island was cut away and the beach narrowed, the portions thus removed being deposited in shoals and bars farther down along the shore, in the region of "High Sandy Beach" and from this point along toward the southern extremity of the Island.

Barren though these low lying sandhills may be at some seasons and seem to some people, yet they possess a charm and beauty peculiarly their own, and never seemed to me more picturesque and delightful than on this morning. The rolling wind swept dunes with their green caps of waving beach grass and low plum; the violet, porphyry particled sand blown into delicate curving lines along their slopes, blending harmoniously with the paler bronze of the sand mass; with now and then glimpses to be caught between the dunes of the fresh and vivid greens of the level marshes, and distant purple inland hills; and on the water side, the deep blues and changing greens of the sparkling, restless sea with the duller purple of the distant Cape Ann; the crystalline, actinic blue of the sky; all these burnished and blended, mellowed and permeated by the bright sunlight of a perfect June day.

"Breathes there a man with soul so dead . . ." whose æsthetic senses would not respond, and quicken with appreciation at this enchantment wrought by Nature's alchemists?

Distance along the level beach is deceitful and a walk of any given length, or with the goal or landmark ahead in sight, is seemingly much longer because of the level unbroken character of the surroundings and the difficulty of walking, the coarse yielding sand affording but insecure footing for the pedestrian. Close to the water's edge one finds the firmest though not always the safest going, if dry feet are a consideration.

Each wave of the ebbing tide leaves its autograph on the sand, a record of "heights attained." The beach is strewn with the shipwrecked homes of thousands of the order *Mollusca* and the varied flotsam of the winter storms.

Nearing the neighborhood of the rookery I found the beach scored with the tracks of many herons. And about a half mile ahead I despaired apparently a patch of sand darker than usual and through the glass learned that it was a company of nearly 200 birds, feeding along the shore, close to the water's edge. Here the herons as well as many species of shore birds, have a spacious feeding ground, the former during the entire season with us, the latter for the brief space they tarry in this latitude; with food cast up in abundance daily, the offal of the sea. A closer view of this flock I thought would be decidedly interesting and a close range shot at them with the camera, would give a picture of interest and value. But long before I could get within range, even before I was within 300 yards, they all took wing and went nearly a mile farther down the beach. Yet my desire for a picture of them in such surroundings was keen, so I put into practise the best tactics in the fine art of stalking, taking to the leeward of the dunes and being careful to keep well concealed behind them. But a little later on making a reconnoissance over the tops of these opposite to where I suppose the flock to be, I was rewarded with no better view of them than I had before for they had again flown, this time too far down the beach for me to follow. Some bird passing overhead had probably given warning to his fellows of the approach of an enemy.

Returning up the beach, for in my chase I had gone considerably past the rookery, I found the moist sand, much traced, crossed and recrossed, with the imprints of many herons' feet, forming a mosaic of triangular figures, but one without definite plan or de-

sign in arrangement. Soon entering the sand hills again I came at length to the immediate vicinity of the rookery, well screened and hidden from the casual passerby in its secluded hollow. A few birds are to be seen sailing too and from the shore or from their quest out on the acres of marshland. But for these few voyagers one might never suspect the close proximity of such a colony.

Before exposing myself to view, I prepared my camera, with the vain hope of securing a picture of the birds as they would take flight when I appeared on the rim of the basin. Several hundreds of them arose with much tumult of flapping and squawking when I first gained the top of the slope and came fairly into view. Such a lively scene of wild life and activity as they present at such a time, would be well worthy the attempt of a professional photographer to portray, but my attempts in this instance were unsatisfactory, for reasons previously noted.

By this date the serious business of housekeeping engaged the time and attention ^{of} nearly all the herons. Only in one or two instances did I note birds carrying nest building materials and only a few comparatively fresh sets of eggs. By far the greater number of nests contained eggs well advanced in incubation and not a few already contained young birds, of varying days of age. Climbing one of the first good sized trees that I came to, a red maple containing four or five nests, I found in one of these a couple of yellow eyed, frightened young, just arriving at the "pin feather" age, their primaries and longer tail feathers just beginning to be prominent. I endeavored to obtain the portraits of these two interesting fledglings, but later the dark room again pronounced failure, not however because of the bad behavior of my subjects for they were as quiet and accommodating as heron manners would permit.

The tardiness of the season was illustrated in the vegetable world by the condition of the shad trees here, many of them being just in bloom, nearly or quite a month later than their usual time on normal seasons inland. The backward season, however, apparently made little difference in the heron world for conditions here on this date were similar to those on a like date during a normal season.

In the midst of my investigations today, being intent on the many interesting things going on around me, a smart shower came up,

unnoticed until the first large drops called it unpleasantly to my attention, then too late for me to seek a secure cover, so taking refuge in the thickest tangle at hand, I enjoyed, in a rather melancholy manner, in this damp shelter, the lunch I had brought along and at the same time served most unwillingly as a free lunch to swarms of hungry mosquitoes. Lunch well over and the rain still continuing without sign of immediate slackening, I decided on a hasty retreat back to the car line arriving there in due season in a somewhat moistened condition; but not wholly disappointed with my visit and the things accomplished, and resolved to come again later in the season.

Accordingly, a week later, June 16, I again visited the Island and rookery with the intention of making further observations to supplement the unfinished work of the previous visit. The weather on this date was clear and uncomfortably warm, with a gentle southwesterly wind blowing. Arrived on the beach about 9 A.M. and found the tide on the ebb and the ocean exceedingly calm. Far down the beach in the direction I was going I saw again a good sized flock of the herons feeding on the refuse along shore, but these kept well ahead of me, making short flights from time to time as I approached them. Numbers, with them, seem to beget wariness and fear, for always when feeding in company in this manner, I have found them to be extremely shy, whereas, when singly, or in the case of only a few, one can frequently work up quite close to them without alarming them.

So calm was the water and quiet the air on this morning that arrived at a point, off abreast of the rookery, I could plainly hear the voices of the birds, young and old, in their haunts a quarter of a mile away. I found the usual activity prevailing in the vicinity of the nests. This was increased to a noisy clamor of alarm when I entered the brushy growth surrounding them. Today as on several previous occasions I secreted myself in some of the thick undergrowth, that afforded a good outlook over many of the nearby nests. In getting into this position I noted very few eggs in any of the nests, most of them at this advanced date being hatched. I saw one nest containing five eggs and secured a fair photograph of it but only in three or four others did I see eggs.

From my vantage point in the dense thicket I watched the do-

mestic affairs of the birds for over two hours and recorded several curious and entertaining things concerning their habits. I learned that Madam Heron is a careful and solicitous mother although the coarsely made and ill kept nest might indicate otherwise. She is very loath to leave her eggs or newly hatched chicks, long exposed to the hot sun or open to a possible discovery by some passing enemy. Birds that had been frightened from their nests when I entered their precincts came readily back to them after a period of from five to eight minutes, after I had hidden myself. These flying low, with sluggish flapping of wings, over the trees would awkwardly alight near their nests and after a greater or lesser interval of staring vacantly about, the slang word "rubbering" aptly describing this performance, they would, more clumsily still, climb down to their nests and settle on the eggs; or in the case of very young birds perch on the nest in a crouching attitude and spread their wings slightly, standing thus to shelter the callow chicks from the intense heat.

How a returning bird could distinguish its own nest from countless others like it amid the surrounding confusion and tangle is one of the curious facts belonging to the realm of instinct, and probably beyond our human ken.

Those nests containing young of a few days of age only, were visited often by the parents at intervals of from fifteen to thirty minutes during the time I kept watch of them near my place of concealment. Their method of feeding, by regurgitation was an interesting procedure to witness, although a little revolting perhaps to persons of a sensitive nature, used to more genteel manners, but withal quite satisfactory to the baby birds who know no other than *a la l'Heronaise*. Up to what age this manner of feeding is continued I could not learn. Many of the young that I judged to be well over three weeks old were still fed in this way. A later visit to the rookery might help to determine this question.

The piping of the young birds was incessant, the volume and force of individual voices varying according to the age of the complainant. The very young birds uttered a peculiar weak shrill whistle-like note not so very unlike the plaintive peeping of domestic chicks, while the older birds voiced their wants with an emphatic "tet tet tet" or "yick-yick-yick." So impressed on my memory are

the varied voices and clamor of the birds here, and the sounds of the surrounding region, that I can even now after several years, call them all distinctly to mind, from the plaintive piping of the hungry young to the answering or alarmed raucous squawks of the mature birds, and the low, droning undertone of the surf on the shore or the swish and flutter of the leaves over my hiding place as the hot wind drew through the hollow. And I have but to hear the uncanny "quawk" of a night heron passing over of a summer evening, to bring at once to my mind the pleasant hours spent in the haunts of the birds here on the Island.

To-day, while sitting here in my brushy covert under some low and stunted trees, watching the comings and goings of the birds, a deer came daintily and noiselessly along through the undergrowths and caught sight of me almost at the moment that I discovered him. One inquiring glance of a moment served to satisfy him of the nature of the danger he was encountering and away he went in precipitate haste with white flag flying, doubtless greatly surprised to find his haunts inhabited by other tenants than the feathered ones he was familiar with.

Seven other species of birds beside the Green and the Black-crowned Night Herons, I have found or am certain breed here on Plum Island in the immediate vicinity of the rookery. At least three pairs of Crows nested in the larger trees in the rookery proper and probably more in the several neighboring wooded hollows. Crow and Red-winged Blackbirds were fairly numerous. I counted eleven nests of the former in the low undergrowth of the basin and found two of the Redwings in the rose bushes and grass in a little open space near the center and lowest part of the hollow.

Kingbirds while not in close proximity to the heronry were common out in the more open bushy country near at hand. Cat birds and Brown Thrashers nested in the thickest tangles and from the many Maryland Yellowthroats seen and heard, I concluded there must have been nearly a dozen pairs nesting in the nearby lowland cover. One of the characteristic bird voices of the Island, wherever you go, back a little way from the shore and deeper rumble of the surf, is that of the Savannah Sparrow (*Passerculus sandwichensis savanna*). His song though weak and insect-like has a carrying quality and reaches one's ear when the small minstrel

is several hundred yards away, and often impossible to locate. From the numbers of these dusky and elusive sprites that I have seen and heard all along the Island and borders of the marshes through the breeding season, I should judge that there must be many nesting pairs of them there.

The Song Sparrow is commonly seen throughout all the warmer months as is also the Vesper Sparrow. Without doubt both these species breed here. Probably a careful survey of the entire region would add several more nesting species to the list. During the month of April, September and October, thousands of sparrows tarry for a time on the Island, finding there an abundance of favorite food, and shelter to their liking. With the possible exception of the rank growths of wild rice, *Zizania aquatica*, found along the flats of the Merrimac River, I know of no place, locally, where the bird student may find a greater number of these birds during the seasons of migration.

My next visit to the rookery was not made until the spring of 1908 when on May 10 I spent a few hours in the locality, finding at this time an apparent increase in the number of herons present and nesting. And this increase despite a considerable amount of harrying and wanton disturbances made during the year previous, by thoughtless and unsportsmanlike persons. Rumors of these annoyances had reached my ear from time to time and their truth was attested to, even at this late date, by unmistakable evidences, such as empty gun shells and shrivelled carcasses or skeletons of last season's birds in the undergrowth or caught in the thicker trees, and by dismantled nests and faded pieces of egg shells protruding here and there in the sand.

At the time of this visit many of the nests already contained full sets of eggs and one I saw with young birds two or three days old, showing that family duties must have commenced at an early date this spring. Several pairs of Green Herons, (*Butorides virescens*) were nesting here also, their nests placed on or near the ground among the rank growth of bushes and grass in the lowest portion of the hollow.

A cold rain storm on this occasion cut my visit short and it was not until four weeks later, June 7, that I was again able to get there.

Nesting activities among the birds were at their height by this time, the all important and laborious duties attending the rearing of broods, demanding continual care and attention on the part of the parents. The incessant calls of the ever hungry young, together with the responsive voices of their elders served to make the immediate neighborhood a noisy if not melodious place and this in addition to the constant coming and going of the birds to and from their fishing grounds lent an air of business and activity more fully apparent than on any of my previous visits.

I climbed a slender maple to nests containing four and five young respectively. These thinly clad little fellows did not take kindly to my advances toward a closer acquaintance, but resented any familiarity, with resort to a thoroughly disgusting performance, that of vomiting onto the edge of the nest, their partially digested food of fish and mussels, this was a defensive measure no doubt or a warning to me to keep my distance, and had my sense of smell been at all over sensitive, I probably would have heeded it.

At another nest that I visited, where the young were older and more fully developed a different means of defence was employed. The largest fellow of the four in the nest, drew himself grandiloquently up to the proud height of some ten inches and awkwardly spreading his wings, and balancing on rather unsteady legs, made several rapid and quite forceful thrusts with his beak, uttering with each thrust and elongation of his neck a husky squawk, quite worthy of the best attempt of his elders. Such an energetic attempt on the part of so youthful and unstable a bird was extremely amusing to me, an onlooker, but a sufficiently serious matter to the performer whose eyes kindled with a savage anger and fear each time I moved, near him.

For one equipped with a small hand camera, carrying a good lens and rapid shutter, opportunities for photographs, showing characteristic phases of nest life of these birds, would have been many and varied. As circumstances were, most of the nests being in the deeper shade or the young birds in constant motion, work with ordinary equipment was out of the question.

Could I have realized that this was the last season that the birds would be nesting here I doubtless would have visited the place

several times again this season, but considering them a permanent fixture of the region or at least pretty certainly to be depended upon to be present each year, I neglected to follow them up closely, and so lost an opportunity for securing further interesting data concerning them, for on visiting the locality the following year, May 23, 1909, I found the rookery completely deserted. The reason for this condition was not plainly apparent, and left the question therefore rather to conjecture than to any satisfactory solution. It was true that the herons during the past two seasons had been much persecuted here and that during the winter of 1908-09 a few of the larger trees had been cut in the wooded hollow in which they had made their homes and more of the trees of the shad and cherry species had succumbed to the attacks of the pestiferous brown tail moths, but notwithstanding these disturbing factors, much good cover was left unharmed, and the herons are remarkably tenacious and persistent in regard to nesting in a favorite locality in the face of annoying circumstances. On the whole it seemed to me that there must have been more pernicious contributory causes to drive them from this place, used probably for over twenty-five years.

I have visited the Island each year since that time and searched the brushy cover, pretty thoroughly, well down toward the northern Ipswich boundary, and although I have seen a few scattered herons along the creeks and ponds of the marshes, which would seem to indicate nesting somewhere in the locality, I have failed to find further proof of a nesting colony.

Early in the present year I was informed by one familiar with the waterways about the southern extremity of the Island, that the herons had been nesting for a few seasons of late, in numbers, on a small wooded islet in that vicinity. Subsequent inquiries and some little searching on my own part have failed to locate the colony, though the frequency with which one still sees the herons flying about or feeding along the marshes would indicate the presence of a rookery not far distant.

BIRD MIGRATION IN THE MACKENZIE VALLEY.

BY WELLS W. COOKE.

THE Mackenzie Valley in northern Canada presents a broad surface with a gentle slope rising only eight hundred feet in the fifteen hundred miles from the mouth of the Mackenzie to the head of steamboat navigation on the Athabaska at Fort McMurray. The height of land between it and the valley of the Saskatchewan to the south is but slightly over two thousand feet in elevation and presents an almost uniform flat surface with not even a ridge of hills to mark the change of slope from the north to the south.

The migratory birds of the Mackenzie Valley have the choice of three principal routes as they return from their winter homes. They can come from the south, through Alberta, western Saskatchewan, western Montana and Utah, where Great Salt Lake, the winter home of thousands of birds, lies directly south of Great Slave Lake. A second route passes up the Pacific coast of the United States to Washington and thence up the valley of the Columbia to the headwaters of the Athabaska or up the valley of the Fraser to the watershed of the Peace River. The third route is up the Mississippi River to southern or central Minnesota; thence to the valley of the Red River of the North and up the Assiniboine and Saskatchewan Rivers to the sources of the Athabaska in Alberta, or across Saskatchewan at right angles to the valleys of these rivers directly to Lake Athabaska.

The first of these routes lies across a wilderness of mountains with many divides 8,000 to 10,000 feet high, and in the southern half of the United States through a district largely a desert. It would therefore seem probable that comparatively few species would employ this route and indeed not a single species is known certainly to migrate from Arizona or Utah to the Mackenzie Valley, and from a study of the data it seems that hardly half a dozen species can possibly travel this route.

There is a modification of this route which ought apparently to form a convenient and fairly direct course from Mexico or Texas to the Mackenzie Valley. This is along the foothills of the Rocky

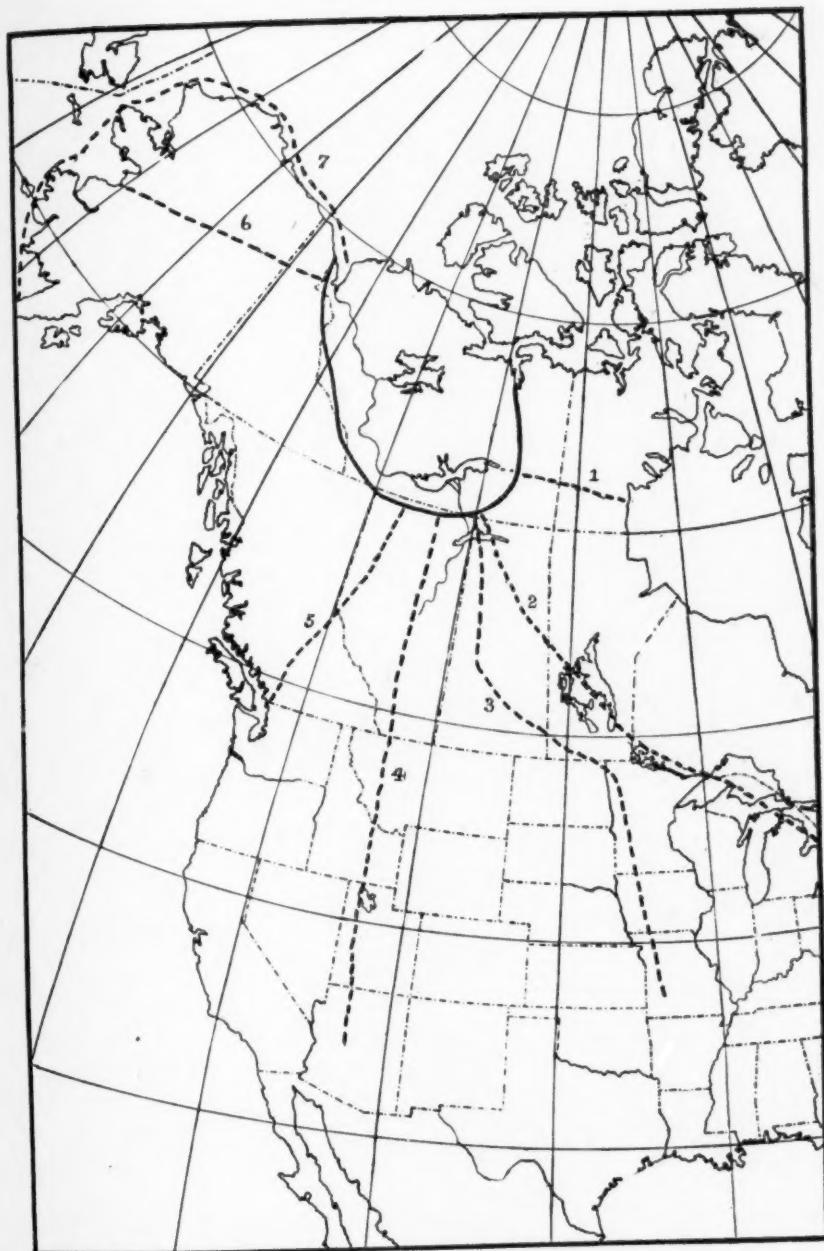


Fig. 1. Principal Migration Routes to the Mackenzie Valley.

Mountains through Colorado, Wyoming and Central Montana to Western Saskatchewan, over an almost uniform plain 5,000-6,000 feet in altitude. Probably some species do follow this route, but no positive proof of this has been found, and it is known that several species for which this would seem to be the most desirable path, actually go many hundred miles out of their way to travel a route farther east. The birds that come into the Rocky Mountains are for the most part birds that are to breed there or to go north only into the southern parts of Canada; very few go even as far north as northern Alberta. Hence in considering the probable routes of migration to the Mackenzie Valley we can ignore the usual north and south direction and consider that the bird comes either from the southeast or the southwest.

The second route from California to the Mackenzie is the shortest of the three. No deserts or high mountains intervene and the whole country seems well adapted to support a wealth of bird life. If this route was largely used, then the birds of the Mackenzie Valley would be most closely related to the species of the western United States. Since the contrary is the fact, very few migratory western birds occurring in the Mackenzie Valley, it follows that only a few species can use this second route.

The third route is the longest and seems quite roundabout to one who is in the habit of thinking of migration as always a north and south movement. In the spring most migratory birds enter the United States along the north shore of the Gulf of Mexico between Florida and Texas. Of these the larger part enter in a still smaller path, six hundred miles wide, the middle of which is the mouth of the Mississippi River. At the border of the United States, the course of migration divides: part of the birds travel northeast to New England, the Gulf of St. Lawrence, and to Labrador's inhospitable shores; a second part migrate straight north to the Great Lakes and Hudson Bay; the third part move at first north nearly to the northern boundary of the United States and then turn northwest to the valley of the Mackenzie and even to Alaska. This last described route is the principal highway for the migratory birds of the Mackenzie Valley and is the most natural and notable migration route on the whole globe. Stretching for more than three thousand miles from the mouth of the Mississippi to the mouth of the Macken-

zie, not a mountain chain or even a ridge of hills interferes with the uniform movements of the birds. The highest elevation is less than two thousand feet, and so gradual are the slopes that, with a few short portages the whole distance can be traversed in a canoe. The whole region is well watered and well timbered, affording ideal conditions for the support of the multitudes of birds which swarm along this route as they do nowhere else on the North American Continent.

If the mouth of the Mackenzie River was due north of Louisiana and in the middle of the continent, bird migration by this route would be a uniform progression from south to north in the spring and the reverse in the fall. On the contrary the valley of the Mackenzie lies nearly two thousand miles nearer to the Pacific than to the Atlantic Ocean, and the warm Japan current produces conditions that interfere with the uniformity of migration and bring about variations, probably not equalled anywhere else in the world, both in the direction and the speed of migration.

That this diagonal northwest and southeast route is traversed by birds from the Mississippi Valley is shown positively in the case of thirty-three species, for these breed in the Mackenzie Valley and pass in migration across the United States and yet occur in the United States as far west only as the eastern edge of the plains. Hence it is certain that these thirty-three species have a northward migration in the Mississippi Valley from eastern Kansas to western Minnesota and thence a northwestward route to Lake Athabaska.

This is shown on the accompanying map of the distribution of the Rose-breasted Grosbeak (*Zamelodia ludoviciana*).

It is evident that the westernmost breeding birds, those that summer in the Mackenzie Valley must have reached their breeding grounds from the southeast by way of the Mississippi Valley.

The cause of the choice of this route is easily found in the conditions of moisture and woodland. All these species are either lovers of damp forests or of moist meadows and marshy lakes. Their favorite surroundings extend in the United States not farther west than eastern Kansas and western Minnesota. On arriving at Manitoba, the dry plains that have been a barrier on their left for the last thousand miles, become better watered and interspersed with groves and soon these groves unite to form almost continuous

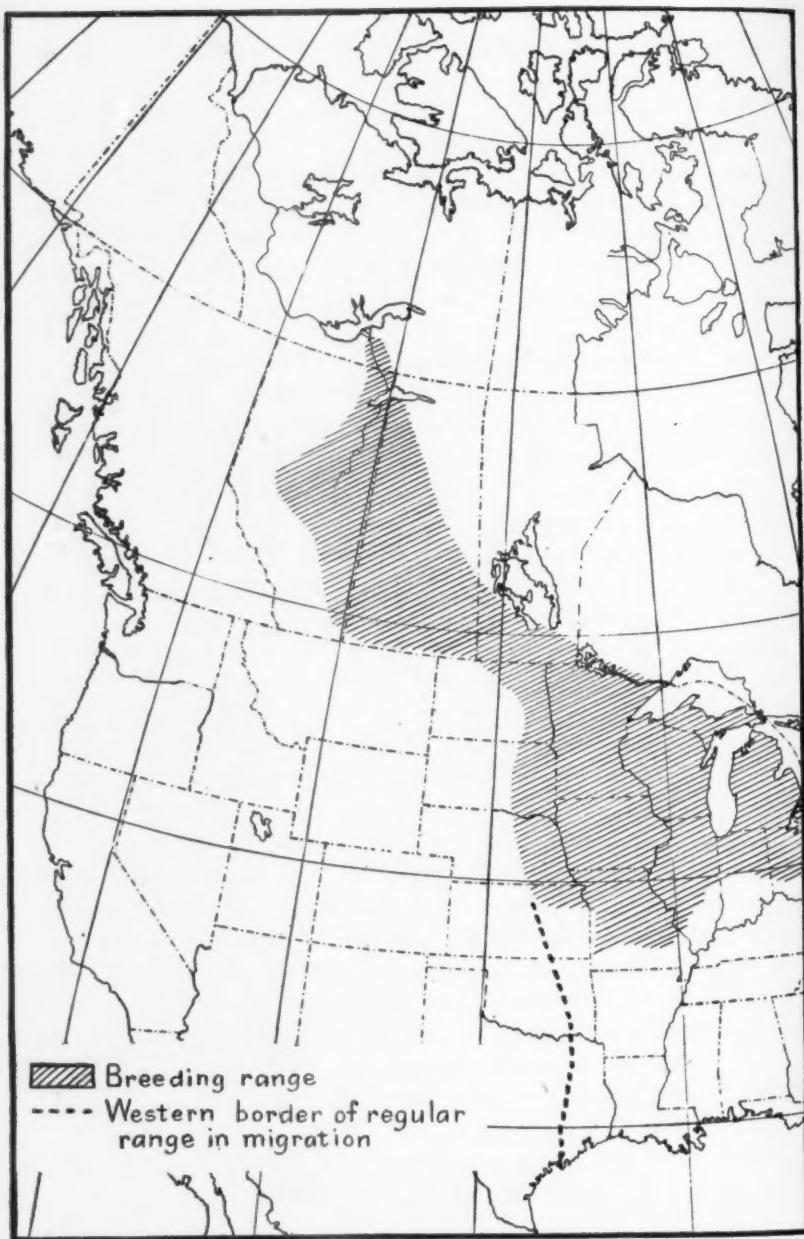


Fig. 2. Rose-breasted Grosbeak (*Zamelodia ludoviciana*).

well-watered forest — a genuine birds' paradise. Attracted by the early season and abundant food supply, the birds turn northward and settle for the summer in the valley of the Mackenzie.

The thirty-three species that traverse this route are *Sterna hirundo*, *Micropalama himantopus*, *Limosa haemastica*, *Numenius borealis*, *Buteo b. borealis*, *Sphyrapicus v. varius*, *Chordeiles v. virginianus*, *Sayornis phoebe*, *Empidonax flaviventris*, *Empidonax trailli alnorum*, *Otocoris alpestris hoyti*, *Cyanocitta c. cristata*, *Euphagus carolinus*, *Carpodacus p. purpureus*, *Calcarius l. lapponicus*, *Passerherbulus n. nelsoni*, *Zonotrichia albicollis*, *Spizella m. monticola*, *Melospiza m. melodia*, *Melospiza georgiana*, *Passerella i. iliaca*, *Zamelodia ludoviciana*, *Vireosylva philadelphica*, *Laniivireo s. solitarius*, *Dendroica tigrina*, *Dendroica magnolia*, *Dendroica castanea*, *Dendroica virens*, *Dendroica p. palmarum*, *Seiurus aurocapillus*, *Wilsonia p. pusilla*, *Hylocichla a. alicia*, and *Hylocichla guttata pallasi*.

A modification of this route from the southeast in a still more pronounced form is followed by the White-winged Scoter (*Oidemia deglandi*), which winters off the coast from Massachusetts to New Jersey and in its spring migration follows the valley of the Connecticut, crosses to the Hudson, thence to the Great Lakes and northward to its summer home in the Mackenzie Valley. It is probable that this same general route is followed by many thousands of the ducks of other species which winter so abundantly along the coast from Chesapeake Bay to Florida, but it is also true that a comparatively small part of these traverse this route as far as Great Slave Lake, since the larger part stop for the summer in the "ducks' paradise" of Manitoba and the Saskatchewan.

Still another route, practically east and west instead of north and south is followed by the three species of Jaeger, which winter on the Atlantic, appear in Hudson Bay with the earliest open water and then cross nearly due west to the breeding grounds about Great Slave Lake, and to the northward.

There are eighteen species that also probably use the main route from the southeast but the proof of this use is not so simple, because these species not only occur in the central Mississippi Valley, but also range regularly across the plains to the foothills of the Rocky Mountains. These eighteen species are: *Grus americana*, *Pisobia*

fuscicollis, *Ereunetes pusillus*, *Bartramia longicauda*, *Falco s. sparverius*, *Colaptes auratus luteus*, *Tyrannus tyrannus*, *Empidonax mimus*, *Agelaius phoeniceus fortis*, *Quiscalus quiscula aeneus*, *Vireosylva olivacea*, *Mniotilla varia*, *Vermivora c. celata*, *Vermivora peregrina*, *Dendroica striata*, *Setophaga ruticilla*, *Hylocichla ustulata swainsoni*, and *Planesticus m. migratorius*.



Fig. 3. Red-eyed Vireo (*Vireosylva olivacea*).

They present some of the most interesting problems in the study of bird migration. In the case of the Red-eyed Vireo, the species breeds along the whole northern tier of states west to Washington,

and occurs in migration in Colorado and Wyoming, but the individuals that appear first in Alberta are not birds that have passed through Colorado, Wyoming and Montana, because the dates of migration, as indicated on the map, show that migration is early and rapid in the middle Mississippi Valley and late and slow along the foothills of the Rocky Mountains. The earliest arrivals in southeastern Saskatchewan appear on the average May 17, but they do not come from directly south, since in eastern Colorado, 600 miles to the southward the birds do not appear on the average until May 22. The first advance to Athabasca Lake by May 28, which is just the date at which they appear on the average in northern Montana and northern Idaho. Therefore it is evident that the birds of the Mackenzie Valley at Lake Athabasca have not come by way of the Rocky Mountains, but by the route near the Mississippi River.

The same general method of proof can be applied to the migrations of the other seventeen species in this group. The proof is particularly clear and convincing in the case of the Robin, Flicker, Bronzed Grackle, Redstart and the Black-poll, Tennessee and Black-and-White Warblers.

Eighty-two other species of migratory birds breed in the Mackenzie Valley and during the winter or in migration occur across the United States from the Atlantic to the Pacific. But even with these species it can be shown that most of them probably reach the Mackenzie Valley from the middle part of the Mississippi Valley. These eighty-two may be divided into fifty-eight species of wide ranging water birds, nine species of hawks and owls, and fifteen species of smaller land birds.

The fifty-eight species of water birds that are found at Lake Athabasca and which also range from the Atlantic to the Pacific oceans present a problem with regard to their route of migration that with the records at hand cannot be certainly solved. The Canada Goose is one of the abundant water birds of the Mackenzie Valley and may be taken as representative of the above mentioned group. The great bulk of the Mackenzie Valley Canada Geese must come from the Mississippi Valley, where the species is abundant, for *Branta canadensis* is rather rare on the Pacific coast, its place there and in Alaska being taken largely by the other three forms, *hutchinsi*, *occidentalis* and *minima*.

But the fact that the Mississippi Valley birds pass to the Mackenzie Valley cannot be proved by dates of migration as is shown by the following records. The Canada Goose begins its migration near the Mississippi river in February. About the twentieth of that month may be considered the date of its normal arrival in southeastern Iowa. Passing slowly north it appears one month later in southeastern Minnesota at the end of the first week in April. Migration in southeastern Nebraska commences at about the same time as in southeastern Iowa, but the birds move north a trifle faster and cross to Saskatchewan about the first of April. Further west the Canada Goose winters not far south of the United States boundary and crosses into southern Alberta the last of March. On the Pacific coast the species winters in British Columbia. When, therefore, it is known that the Canada Goose arrives at Lake Athabaska April 20, no certain conclusion can be drawn from this data as to whether these earliest birds come from Manitoba, Alberta, or British Columbia. The last furnishes its most northern winter home and hence would require the least rapid migration in spring to reach Lake Athabaska by the given date. The journey by way of Manitoba or eastern Saskatchewan is a longer distance and the later start requires a higher speed of migration. Hence if no other information was available, the migration dates alone would lead one to suppose that the earliest birds at Lake Athabaska came from the southwest. But as stated at the outset, the relative numbers of the birds east and west of the Rocky Mountains, make it certain that most the birds of Lake Athabaska really do come from the Mississippi Valley. Since this is true of the geese, it may be assumed to be true also of the Mallard and Pintail Ducks which travel in company with the geese and have the same range from the Atlantic to the Pacific.

The same method of reasoning may be applied to the larger part of the fifty-eight species of wide-ranging waterfowl that occur regularly at Lake Athabaska. Most of them are abundant in migration across the moist plains from Kansas to Saskatchewan, but are comparatively rare in the whole mountainous region of western United States where favorable localities either for breeding or for feeding during migration are few and of small area. Hence it must be true in general that the untold thousands of water birds that frequent

the lakes and marshes of the Mackenzie Valley, come from the moister portions of the Mississippi Valley.

With regard to the nine species of migratory hawks and owls of wide range that visit Lake Athabaska nothing can be judged at present either from distribution or migration as to the route or routes they employ. Fifteen species of the smaller migratory land birds have the same range and in some cases, the dates of migration afford a hint of the route traveled. Thus in the case of the Crow, the dates of migration show clearly that the earliest individuals to reach southwestern Manitoba come not from South Dakota as would be expected, but from the timbered regions of Minnesota. The date of arrival at latitude fifty degrees in southwestern Manitoba is March 27, as determined by fourteen years' observations from four neighboring towns. March 27 is a fair average date for the arrival of the Crow in east central South Dakota, three hundred and fifty miles to the southward; while the average date of arrival in southern North Dakota is a week later than in Manitoba. Continuing in the same general northwestern course it is probable that the Crows appearing April 2, 1893, at Osler, Saskatchewan came from Manitoba rather than from Montana; since this date would be considered an early date of arrival in southeastern Montana. In this manner the dates of migration show that the earliest Crows in the Mackenzie Valley come from the wooded districts of the Mississippi Valley.

The Myrtle Warbler presents a quite similar set of dates. This species ranges from the Mississippi Valley throughout the Rocky Mountains and to the Pacific, becoming much rarer west of the mountains. In its spring migration, it reaches southern Manitoba April 23, at about the same time as its first appearance in central Nebraska and northern Colorado, showing conclusively that the Manitoba birds come from the southeast. It is equally sure that the arrival at Osler, Sask. latitude fifty degrees May 4, 1893, came from the southeast, for this is the usual time of arrival in central Montana latitude forty-seven degrees. Farther north a new possibility presents itself, since the May 16 birds of Lake Athabaska might, as far as the date is concerned, have come from British Columbia in the southern portion of which Province they arrive the middle of April. To determine this latter point use can be

made of the general principle of parallel lines of migration. Since it is true that the birds of western Minnesota pass northwestward to Saskatchewan, it is probable that the birds of Montana also proceed in a northwestern direction and traverse Alberta, in which case it is altogether unlikely that the birds of the same species would be migrating northeast from British Columbia to Athabaska across the route of the eastern birds and at right angles to it. A more reasonable assumption is that the birds of British Columbia migrate also northwestward and proceed to Alaska, where the dates of arrival, May 5 at Fort Reliance on the middle Yukon and May 18 at the mouth of that river, show that the birds must have come from British Columbia.

The migration records now available are insufficient to determine whether the remaining thirteen species of small migratory wide-ranging land birds come to the Mackenzie Valley from the southeast, or southwest.

There remain twenty-three species of migratory birds which breed in the Mackenzie Valley, but which in migration are confined to the Western United States, ranging not farther east than the eastern edge of the plains. These may be divided into three groups. The first group comprises nine species that in winter are confined to the Pacific coast; the second group, three species that range east to the Rocky Mountains, and the third, sixteen species that occur east to the plains.

The species of the first group, whose routes are best known, are the Pacific Eider (*Somateria v-nigra*), Black Brant (*Branta nigricans*), Short-billed Gull (*Larus brachyrhynchus*), Ross's Goose (*Chen rossi*), and the Northern Varied Thrush (*Ixoreus naevius meruloides*). The accompanying chart shows the principal migration route followed by each of these species. They all cross the Rocky Mountains, but in widely separated latitudes. The Ross's Goose crosses the lofty ranges of the main chain of the Rocky Mountains from northeastern California to northwestern Montana and thence north across the Mackenzie Valley to its breeding grounds on the Arctic islands.

The Northern Varied Thrush winters mainly in the interior of California and in western Nevada. Its main migration route crosses thence through northern Idaho and northwestern Montana and

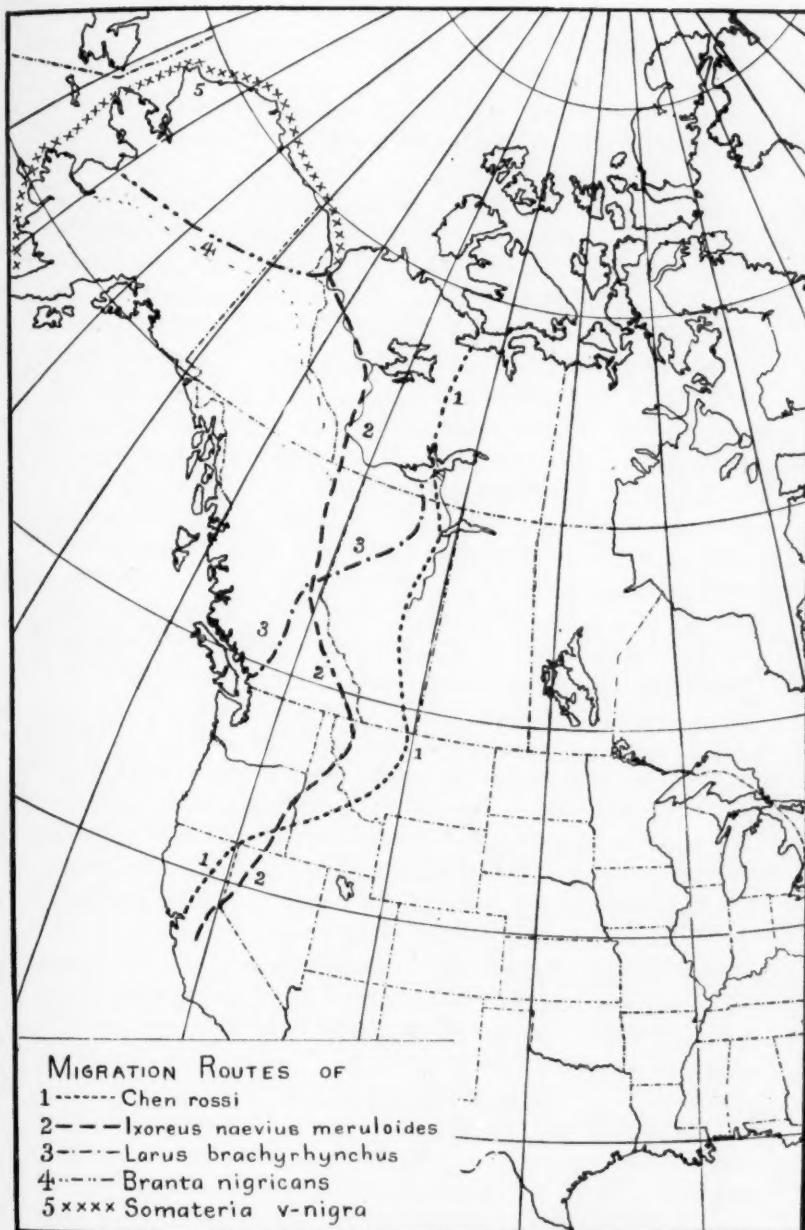


Fig. 4. Migration Routes from the Pacific Coast to the Mackenzie Valley.

along the mountains of eastern British Columbia to the valley of the Liard and reaches the Mackenzie a few miles below Fort Simpson.

The relation of the breeding and wintering areas of the Short-billed Gull makes it probable that the main migration route follows up the Fraser River and down the Peace River to the breeding grounds on Great Slave Lake and northward.

The Black Brant is a common breeder at the mouth of the Mackenzie and along the coast to the eastward. It does not reach Mackenzie from the south, indeed it is not known inland in that Province, but in spring migration it passes up the Pacific coast to the mouth of the Yukon, up this river to its junction with the Porcupine, and up this stream and across the low divide to the mouth of the Mackenzie. It seems probable that the Pacific Loon (*Gavia pacifica*) and the Sabine Gull (*Xema sabini*) follow this same route, but the proof is not as yet conclusive.

The Pacific Eider (*Somateria V-nigra*) does not occur inland in either Alaska or Mackenzie. It winters around the Aleutian Islands and is a common breeder on the coast east of the mouth of the Mackenzie. Hence it follows that the line of migration must pass through Bering Strait and go round the northern coast of Alaska. It seems certain that the King Eiders (*Somateria spectabilis*) and the Glaucous Gulls (*Larus hyperboreus*) breeding on the Mackenzie coast arrive by the same route rather than from the Atlantic side. Indeed it can be said there is nothing to indicate that any birds migrate regularly from the Labrador coast north-west to the coast of western Mackenzie.

A migration route as yet unsolved is that of the Yellow-billed Loon (*Gavia adamsi*). It appears at Great Slave Lake as soon as any part of the lake is open. It is not known at any time of the year, either east, south, or west of Great Slave Lake, and at the time it appears there, no open water exists anywhere between that Lake and the Arctic Ocean, and the species is not yet recorded from anywhere inland in Alaska. In fact the records as they stand at present are explainable only on the theory of a single flight from the open Polar Sea to the summer home on Great Slave Lake, and such a flight is scarcely believable.

The three western species occurring in the Mackenzie Valley

that range from the Rocky Mountains to the Pacific are *Spizella passerina arizonæ*, *Vireosylva gilva swainsoni*, and *Piranga ludoviciana*. The migration route of this last species is especially interesting. It breeds over the whole of western United States from the eastern foothills of the Rocky Mountains to the Pacific. Hence if one saw the map of the breeding range and noted that the line of the easternmost limit was almost north and south and extended without a break from Mexico to Canada, he would take it for granted that the breeding birds of Alberta reached their summer home by a migration route along the eastern slope of the Rocky Mountains. Such reasoning is correct with almost all species, but an examination of the large amount of migration data available shows that the Western Tanager is an exception to the rule. The bird winters in Guatemala and when it starts north in the spring the individuals along the Pacific coast move north faster than those that choose to migrate along the eastern slope of the Rocky Mountains as shown by the isochronal lines on the accompanying map. By May 10, the earliest migrants have reached northern Washington along the Pacific coast, while in the Rocky Mountains they are just entering southern Colorado. During the next ten days the eastern birds loiter across Colorado to southeastern Wyoming, while on the same date, May 20, the first birds appear in central Alberta, a thousand miles farther north. It is evident that these latter birds could not have come by way of Colorado, but must have come from Washington and British Columbia, though this latter assumption requires that they cross the main chain of the Rocky Mountains at a time in the spring when even the lowest passes are still covered with snow. It is true that warm weather has already come by this date in the southern Mackenzie Valley, but it is one of the strangest problems in bird migration as to how the Western Tanagers know that on the other side of those snow clad ranges summer is waiting for them.

The migration dates of the Western Chipping Sparrow show that the breeding birds of Alberta follow the same general route as outlined above for the Western Tanager, while the data so far available concerning the migration of the Western Warbling Vireo throw no light as to the route employed.

The fifteen western species breeding in the Mackenzie Valley and

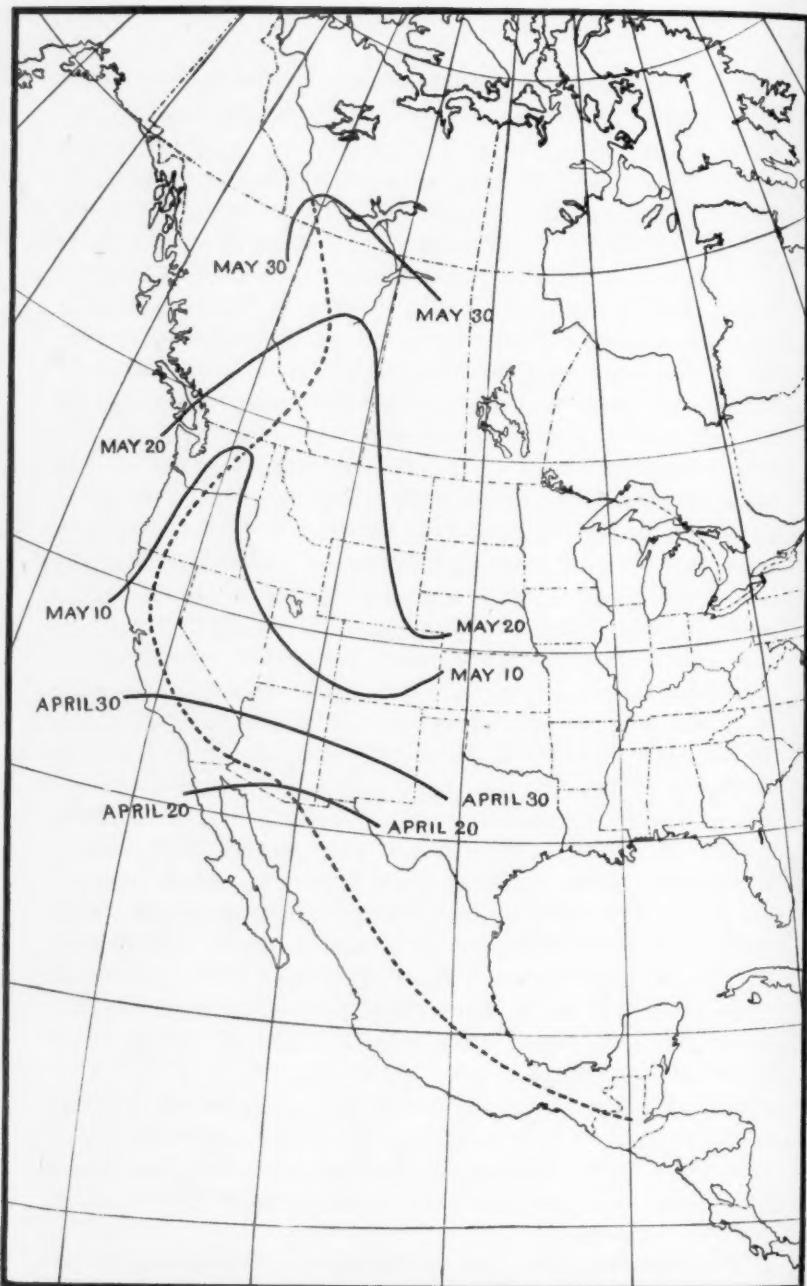


Fig. 5. Migration Route of the Western Tanager (*Piranga ludoviciana*).

ranging to the eastern edge of the plains in the United States are: *Larus californicus*, *Branta canadensis hutchinsi*, *Grus canadensis*, *Macrorhamphus griseus scolopaceus*, *Sayornis sayus*, *Xanthocephalus xanthocephalus*, *Calcarius lapponicus alascensis*, *Calcarius pictus*, *Poæcetes gramineus confinis*, *Passerculus sandwichensis alaudinus*, *Passerherbulus lecontei*, *Zonotrichia leucophrys gambeli*, *Spizella monticola ochracea*, *Spizella pallida*, and *Sciurus noveboracensis notabilis*.

Larus californicus winters abundantly on the coast of British Columbia and breeds commonly from Great Slave Lake northward, showing that its route of migration is northeast across British Columbia.

Branta canadensis hutchinsi is known to migrate in immense flocks from the plains of the Mississippi to those of the Mackenzie on its way to its northwestern breeding grounds. The same is true of *Macrorhamphus scolopaceus*, the line of whose northwestern migration is known to extend from Florida to Great Slave Lake; the same route is undoubtedly followed by *Grus canadensis*.

The earliest individuals of *Sayornis sayus* reach southern British Columbia about two weeks earlier than the first arrive in southern Colorado. The Alberta dates agree with those of Montana rather than those of British Columbia and Washington, while the dates on the lower Mackenzie and the Yukon can be satisfactorily explained only on the supposition that these birds have come from British Columbia. *Xanthocephalus xanthocephalus* is so rare at Athabasca Lake and northward, that it can be considered as hardly more than a straggler in the Mackenzie Valley. The date of arrival in eastern Saskatchewan however is so much earlier than in eastern Montana, as to indicate that the birds of Saskatchewan come from the southeast. The migration records of *Zonotrichia leucophrys gambeli* are so much earlier in British Columbia and Alaska than in corresponding latitudes to the eastward as to make it practically certain that the Alaska birds have come by way of the interior warm valleys of British Columbia. Hence it is equally probable that the individuals which swarm in Nebraska, Kansas, and southward during migration and winter are the birds that pass north through Manitoba and Saskatchewan to breed in the Mackenzie Valley.

The migration route of *Calcarius pictus* is evident since the great majority of the individuals are confined during migration and winter to a narrow belt of plains country extending from Texas northward to the Saskatchewan and thence northwestward along the Mackenzie to the summer home on the Barren Grounds of the Arctic. The same route is followed more or less closely by *Passerherbulus lecontei*, *Spizella pallida*, and *Calcarius lapponicus alascanus*.

One of the strangest migration routes to the Mackenzie Valley is that of the Yellow-bellied Sapsucker (*Sphyrapicus v. varius*). The mouth of the Nahanni River a hundred miles northwest of Fort Simpson forms the normal limit of the species' range in that direction; this is in longitude 124° W. The Yellow-bellied Sapsuckers breeding here come by way of Minnesota at least as far east as longitude 96° W. The range of this species extends thence south through western Missouri on the meridian of 94° and then southwest through the whole eastern half of Texas to at least longitude 103° W. in southwestern Mexico. Thus the migration route forms a bow, the southern half extending through nine degrees of longitude in a portion of the globe where this is equal to six hundred miles, and the northern half through thirty degrees of longitude, equivalent in those high latitudes to nine hundred miles.

The above routes account for the different groups of species breeding in the Mackenzie Valley as follows:

Eastern species ranging in the central United States only to the edge of the Plains.	33
Eastern species ranging regularly or occasionally to the Rocky Mountains in the central United States.	19
Species that in migration or during the winter occur across the whole United States from the Atlantic to the Pacific.	82
Western species confined almost entirely to the Pacific coast.	9
Western species, ranging only occasionally east of the Rocky Mountains in the central United States.	3
Western species, ranging to the eastern edge of the Plains in the central United States.	15
Total migratory species breeding in the Mackenzie Valley, and wintering to the southward.	161

In addition to these, the list of the birds of the Mackenzie

Valley includes several groups of species that do not come under any of the above headings.

Non-migratory species and those which occur during the winter.

Species that barely reach the Mackenzie Valley from the south, being found on the Athabaska and not ranging north to Lake Athabaska.

Species not included under the previous headings, being for the most part stragglers or species that are most common on the Arctic islands.

Total species known to occur in the Mackenzie Valley 268

The distinctly eastern character of the avifauna of the Mackenzie Valley is shown by the fact that of the one hundred and sixty-one regular breeding migrants, only eighteen are known with certainty to reach the Valley from the west or southwest, while it is known with equal certainty that seventy-one reach it from the southeast or east; and of the remaining seventy-two species, mostly water-birds, probably four-fifths come from the central Mississippi Valley.

LIST OF WATER AND SHORE BIRDS OF THE PUGET SOUND REGION IN THE VICINITY OF SEATTLE.

BY SAMUEL F. RATHBUN.

THIS region is a much favored resort of many of the species of water birds whose habitat is the Pacific coast and this undoubtedly is accounted for by the fact that within its boundaries are embraced the essential desiderata necessary to attract them, viz. protection from the elements, an abundance of food and a most equable temperature throughout the year.

Its geographical location is likewise fortuitous being nearly in the direct line of migration of the countless numbers of birds whose summer home is the North Pacific and of these, thousands use this region as a winter resort, finding here every requirement

necessary for an existence; this fact being strongly impressed upon the observer by the abundance of bird life that will be seen more particularly during the period of the winter months, at which season the number of individual birds exceed that, that may be noted during the balance of the year.

Relative to the equitable climatic conditions that prevail it is quite appropriate to quote from "U. S. Department of Agriculture, Weather Bureau Summary of the Climatological data for the United States" "Section 19, Western Washington," which information has been courteously given me by Mr. G. N. Salisbury, Section Director at Seattle.

"The mean temperature of the Puget Sound country ranges from 38 degrees in mid-winter to 62 degrees in mid-summer, while the range near the coast is considerably less, being from 40 degrees in winter to 60 degrees in summer. The average daily march of temperature in the Puget Sound region is from 35 degrees to 45 degrees in mid-winter and from 55 degrees to 75 degrees in mid-summer. The average daily range is noticeably small in winter, showing the equability of temperature," "Frequently in winter the difference between the day and night temperatures is only 5 degrees or less."

It would thus appear that in so far as the mean temperature of the region during winter is concerned, it must prove attractive to many species at that season and when to this is added the other requirements necessary to sustain life, one reason of the region being so favored by the aquatic species is quite obvious.

There may be an additional reason for this abundant bird life during the winter, as it is quite possible that during the autumnal migration, the probable route followed by a majority of the migrants is along the east side of Vancouver Island to a point of intersection with the Straits of Juan de Fuca at the Straits eastern terminus, at which intersectional point a certain amount of "banking" or accumulation of individuals occurs, although no doubt a proportion continue to migrate towards the Pacific Ocean to the westward, or follow the Sound southward. But that this accumulation does occur is quite probable for at and within a fairly defined radius of the intersectional point named, will be found during the winter months the greater abundance of bird life, not necessarily

of species but of individuals; this being noted by the writer on various trips to the section named and appearing particularly to apply to species belonging to the Alcidae, Phalacrocoracidae, to some extent the Anatidae, but not in any great degree to the Laridae, as the representatives of this latter Family, that use this region as a winter resort, seemingly are well distributed.

The following List is intended as supplemental to the original "List of Land Birds of Seattle" published in 'The Auk' (Vol. XIX, No. 2, April, 1902) and an Addendum to which appeared in 'The Auk' (Vol. XXVIII, No. 4, October, 1911).

1. ***Aechmophorus occidentalis.*** WESTERN GREBE.— Common spring and fall migrant and observed during the winter months.
2. ***Colymbus holboelli.*** HOLBOELL'S GREBE.— Spring and fall migrant. Sometimes noted during the winter.
3. ***Colymbus nigricollis californicus.*** EARED GREBE.— Noted as a migrant and during the winter.
4. ***Podilymbus podiceps.*** PIED-BILLED GREBE.— Common summer resident and breeds.
5. ***Gavia immer.*** LOON.— Resident and breeds but not so commonly as formerly in this immediate locality. More abundant during the winter.
6. ***Gavia pacifica.*** PACIFIC LOON.— Noted as a fall migrant.
7. ***Gavia stellata.*** RED-THROATED LOON.— To some extent a winter resident.
8. ***Lunda cirrhata.*** TUFTED PUFFIN.— Apparently rare in this immediate locality but not uncommon on the lower sound where it breeds to some extent.
9. ***Synthliboramphus antiquus.*** ANCIENT MURRELET.— Rare. A specimen taken August 9, 1913 by D. E. Brown of Seattle.
10. ***Brachyramphus marmoratus.*** MARBLED MURRELET.— From November until April a common resident becoming rarer as the season progresses, but is observed intermittently during the balance of the year. D. E. Brown has taken a number of birds in full breeding plumage, one of which collected May 23, 1914 contained an egg an inch in diameter. It would thus appear that this locality may be within the southern portion of the breeding range of the species.
11. ***Cephus columba.*** PIGEON GUILLEMOT.— Common resident and breeds.
12. ***Uria troille californica.*** CALIFORNICA MURRE.— Winter resident.
13. ***Stercorarius parasiticus.*** PARASITIC JAEGER.— Noted on several occasions in September and October flying about the bay in front of the city.
14. ***Rissa tridactyla pollicaris.*** PACIFIC KITTIWAKE.— Have seen

this species a number of times during the winter with other Gulls about the tide flats near the city.

15. **Larus glaucescens.** GLAUCOUS-WINGED GULL.—Common from October to latter part of April, but breeds sparingly on some of the islands in the lower sound.

16. **Larus occidentalis.** WESTERN GULL.—Common winter resident.

17. **Larus californicus.** CALIFORNIA GULL.—Spring and fall migrant. On occasions observed during the winter.

18. **Larus brachyrhynchus.** SHORT-BILLED GULL.—Common from November until April.

19. **Larus heermanni.** HEERMANN'S GULL.—Not uncommon as a summer visitant.

20. **Larus philadelphia.** BONAPARTE'S GULL.—Spring and fall migrant.

21. **Sterna paradisaea.** ARCTIC TERN.—A rather regular fall migrant. Have observed it a number of times flying about the sound in front of the city.

22. **Phalacrocorax auritus cincinatus.** WHITE-CRESTED CORMORANT.—Not an uncommon winter resident.

23. **Phalacrocorax penicillatus.** BRANDT'S CORMORANT.—Common winter resident.

24. **Pelecanus erythrorhynchos.** WHITE PELICAN.—A rare migrant.

25. **Mergus americanus.** MEGANSER.—A common species from October until April and regularly breeds along the mountain streams flowing from the Cascade Mountains to the sound.

26. **Mergus serrator.** RED-BREASTED MEGANSER.—Common migrant and often observed in winter.

27. **Lophodytes cucullatus.** HOODED MEGANSER.—Rather common during the migrations and have observed it during the winter.

28. **Anas platyrhynchos.** MALLARD.—A common resident but most abundant from October until May. Breeds.

29. **Chaullelasmus streperus.** GADWALL.—Rare migrant.

30. **Mareca penelope.** EUROPEAN WIDGEON.—Can be regarded only as accidental. An adult male was brought me in February, 1912, for identification, that a few days previously had been shot on the lower sound.

31. **Mareca americana.** BALDPATE.—Observed from October until early May, but is a common winter resident.

32. **Nettion carolinense.** GREEN-WINGED TEAL.—Common from October until May. Undoubtedly breeds sparingly as it has been noted during the summer.

33. **Querquedula discors.** BLUE-WINGED TEAL.—Rare.

34. **Spatula clypeata.** SHOVELLER.—A rather common species from October until April and breeds sparingly. Found nesting at Lake Washington, May 15, 1893.

35. **Dafila acuta.** PINTAIL.—From late fall until April one of our most abundant ducks.

36. **Aix sponsa.** WOOD DUCK.—Formerly a not uncommon summer resident in this immediate locality, but now seldom noted.

37. **Marila americana.** REDHEAD.—Occurs as a rare migrant.

38. **Marila valisineria.** CANVAS-BACK.—Common from November until April but most abundant during winter.

39. **Marila marila.** SCAUP DUCK.—Same as the preceding, *M. valisineria*, with which it is often found associated.

40. **Marila affinis.** LESSER SCAUP DUCK.—More or less common during the winter months.

41. **Marila collaris.** RING-NECKED DUCK.—Regard this species as uncommon, as have noted it but a few times and during the winter months.

42. **Clangula clangula americana.** GOLDEN-EYE.—Not uncommon as a winter resident.

43. **Charitonetta albeola.** BUFFLE-HEAD.—Common winter resident, departing in April.

44. **Harelda hyemalis.** OLD-SQUAW.—Observed from November until April but most common during the winter months.

45. **Histrionicus histrionicus.** HARLEQUIN DUCK.—A rather rare species during the winter and have noted it until May.

46. **Oidemia americana.** SCOTER.—A regular but rather uncommon winter resident.

47. **Oidemia deglandi.** WHITE-WINGED SCOTER.—Common from November until May.

48. **Oidemia perspicillata.** SURF SCOTER.—Common winter resident.

49. **Erismatura jamaicensis.** RUDDY DUCK.—Formerly rather common during the migrations but of late years has not been so often noted.

50. **Chen hypoboreus hypoboreus.** SNOW GOOSE.—On two occasions have seen on the sound near Seattle small flocks of what we regarded as this species. But on the lower sound flocks of white geese are quite regularly observed during the migrations.

51. **Anser albifrons gambeli.** WHITE-FRONTED GOOSE.—Not uncommon as a spring and fall migrant.

52. **Branta canadensis occidentalis.** WHITE-CHEEKED GOOSE.—More or less a regular migrant.

53. **Branta canadensis minima.** CACKLING GOOSE.—A rare migrant.

54. **Branta nigricans.** BLACK BRANT.—From observations the most common of the Anserine. A regular spring and fall migrant and common winter resident but seemingly restricted during this period to certain localities on the sound, doubtless on account of its food supply. A very easy bird to decoy. Generally arrives about the first of December and last seen during April.

55. **Olor columbianus.** WHISTLING SWAN.—A regular but not common migrant.

56. **Ardea herodias fannini.** NORTHWESTERN COAST HERON.—A common resident and breeds.
57. **Grus canadensis.** LITTLE BROWN CRANE.—Although a quite regular migrant, apparently not very common.
58. **Rallus virginianus.** VIRGINIA RAIL.—Common summer resident and breeds.
59. **Porzana carolina.** SORA.—A not uncommon summer resident and breeds.
60. **Fulica americana.** COOT.—Abundant resident. Breeds. Seemingly restricted to the fresh water.
61. **Lobipes lobatus.** NORTHERN PHALAROPE.—A rare spring but regular fall migrant.
62. **Gallinago delicata.** WILSON'S SNIPE.—Abundant spring and fall migrant. Not uncommon during the winter.
63. **Macrorhamphus griseus scolopaceus.** LONG-BILLED DOWITCHER.—Observed as a not uncommon fall migrant.
64. **Tringa canutus.** KNOT.—A rare spring and fall migrant. Mr. D. E. Brown has several spring records.
65. **Pisobia maculata.** PECTORAL SANDPIPER.—Rare and noted as a fall migrant only.
66. **Pisobia minutilla.** LEAST SANDPIPER.—Common migrant, more particularly during the early fall.
67. **Pelidna alpina sakhalina.** RED-BACKED SANDPIPER.—Not an uncommon spring and fall migrant and sometimes observed in winter.
68. **Ereunetes mauri.** WESTERN SANDPIPER.—A rather common fall migrant.
69. **Calidris leucophæa.** SANDERLING.—A rare spring but common fall migrant and probably winters to a limited extent. Observed March 26, 1910; January 11, 1911; and on December 11, 1913, flocks numbering several hundred birds were noted at Smith's Island, located near the entrance to Puget Sound. On December 18, following we observed a flock of about sixty at this same point and on the nineteenth and twentieth at Dungeness, about seventeen miles southwest, flocks aggregating nearly a thousand birds were watched busily feeding, they allowing an approach to within twenty feet. Among the Sanderling were a few Red-backed Sandpipers.
70. **Totanus melanoleucus.** GREATER YELLOW-LEGS.—Regular spring and fall migrant.
71. **Totanus flavipes.** YELLOW-LEGS.—Not uncommon as a spring migrant.
72. **Helodromas solitarius cinnamomeus.** WESTERN SOLITARY SANDPIPER.—Very rare. Specimen taken May 6, 1914, by D. E. Brown.
73. **Catoptrophorus semipalmatus inornatus.** WESTERN WILLET.—One record. September 6, 1913, by D. E. Brown.
74. **Actitis macularia.** SPOTTED SANDPIPER.—Rather common summer resident and breeds.

75. *Numenius hudsonicus*. HUDSONIAN CURLEW.—Regular spring migrant.

76. *Squatarola squatarola*. BLACK-BELLIED PLOVER.—Regular spring and fall migrant but more common during the latter period.

77. *Oxyechus vociferus*. KILLDEER.—Resident and breeds but most common from March to December.

78. *Ægialitis semipalmata*. SEMIPALMATED PLOVER.—Not an uncommon spring and fall migrant.

79. *Ægialitis nivosa*. SNOWY PLOVER.—A rare migrant. Recorded May 6, 1914 by D. E. Brown.

80. *Arenaria interpres morinella*. RUDDY TURNSTONE.—Rare migrant. Taken May 6, 1914 by D. E. Brown.

81. *Arenaria melanocephala*. BLACK TURNSTONE.—A rare migrant and possibly rare winter resident. Have an adult male taken February 22, 1914, collected by myself.

82. *Hæmatopus bachmani*. BLACK OYSTER-CATCHER.—Formerly not uncommon on the lower sound as a summer resident but of late years has become rare.

THE BIRDS' BATH.

BY HEYWARD SCUDDER.

A VERY little brook winds through a swamp. On the north and east, swamp maples, high and of thick foliage, make a dense shade; on the south and west, low alders, and open spaces filled with Joe-pye-weed and golden-rod let in the sun, and offer perches on which to dry and dress feathers. At intervals the brook widens into shallow pools.

In the course of the day — most abundantly between eleven and three — all the land birds, except the crows and owls, come to bathe in these pools.

A Prairie Warbler flies down on one side of a pool, hesitates at the brink like one fearing the chill of the water, then dashes in and begins splashing. On the other side a Black and White Warbler starts his bath. Then along comes a Robin, hops into the pool and through it till he comes to water deep enough to suit him, saying loudly, "Tut-tut! Tut-tut!" as if in scorn of the warblers, which

fly off instantly. After the Robin has gone, is an interval; then more small birds begin bathing, till the harsh cry of a Blue Jay near at hand, drives them into the bushes. There are no hawks here, except in migration. But a Blue Jay's presence seems to cause the same sort of fear among the small birds that a hawk's does in other places. Only Robins and Starlings hold their own without fear.

Is this bathing the explanation of the disappearance of birds in the middle of the day during the nesting season and all through the hot weather? Anyone who has been at a seashore resort knows how long it may take to get to the beach and into the water, take a bath, dress and then get home again, especially when one always has to be on the look-out to avoid certain objectionable persons, and when one is most particular about dressing and having one's clothes perfectly put on. In the case of the birds there is no way of telling how long it takes them to come and go, and to make sure that there is no enemy around. The numbers of certain kinds of birds can be explained in a satisfactory way only on the theory that most of them come from considerable distances. For the presence of ten or a dozen Prairie Warblers every hour would show a greater abundance of these birds near the swamp than is indicated by a study of the birds within a radius of a mile, though, of course, an accurate census of a bird population is really impossible. The other explanation for the abundance of birds is that the same bird may bathe repeatedly during the day. This is undoubtedly true in some cases, and possibly the rule during hot weather. But within a length of time as short as one or two hours, it requires a number of absences either from the search for food, or from the nest, which seems too great to be probable.

Certain pools are frequented for bathing, because of favorable conditions of water supply, depth of water, places for drying and preening feathers, and freedom from enemies. Within a half mile, one set of pools will abound with birds, while all the rest have only a few visitors or none at all. Yet it is often impossible to see any reason for the choice which has been made.

We all know the way in which a bird usually takes a bath, ruffling out its feathers, half opening its wings, then dipping its head in and out of the water, splashing with its wings and tail, and shaking its body vigorously.

But there are four variations of the way of bathing, seen chiefly in the nesting season. Why a bird should choose one way rather than another is a mystery for which I have never been able to furnish any explanation, even by the wildest use of imagination. The factors which have been considered are the temperature, the wind, the amount of sun or cloud or rain, the time of day, the sex of the bird when it can be known from plumage, the appearance of the bird (for a Chipping Sparrow certainly looks as if it were more careful of its feathers and general appearance than a Phoebe is), and the size and kind of bird. What is left? I think that the question can be solved only by one who is able to live with a bird, and keep up with it when it leaves its nest — which sounds very difficult.

Now as to these different ways of bathing. In the typical form there is only the length of time to consider. This has ranged in my observation from two seconds to one hundred seconds.

The next most common form is a series of short baths in the typical way, each lasting from two to fifty seconds, with an average of about five seconds. Then the bird flies to a perch on which it stays a short time, sometimes with just a little shake, sometimes with elaborate preening of feathers. Then it takes another bath and flies back to the perch for drying. In this way the bath is repeated sometimes six or seven times. In these cases the birds were entirely free from fear and from disturbance, an important consideration. For if a bird is driven out of the water by another bird, it will often fly up, perch, and come back again when the other is through. It may be driven away several times, yet always return until satisfied, as if some particular length or completeness of bathing was necessary.

Then comes a variation in which the bird takes a number of short dips, but does not shake much while in the water, though the wings are partly opened.

The fourth variation consists in a very vigorous shaking on a perch in the air before taking a bath, which may be any of the three preceding kinds. But I have never seen this shaking followed by the fifth kind of bath.

This fifth variation consists in keeping the wings tight shut or nearly tight shut, while in the water. The bird may splash about vigorously, or take a quiet bath.

Now I have seen these five kinds of baths taken by so many birds, that I am sure of their importance in bird life. Certain other variations occur occasionally. Thus, a Woodcock, after taking a typical bath, stood in the water while dressing its feathers. When all was done, and the feathers lying smooth, it stretched its wings out fully, then flapped them very quickly for about three seconds, raising them so high that they nearly met above its back. After that, it walked off quietly.

These observations were made chiefly in the southeastern part of the state of New York. The birds most often seen were Blue Jays, Flickers and Downy Woodpeckers, Wood-Thrushes, Robins, Starlings, Catbirds, Scarlet Tanagers, Orioles, Bluebirds, Cowbirds, Red-winged Blackbirds, Brown Thrashers, and various kinds of vireos, flycatchers, sparrows, and warblers.

Most of the observations were made between the middle of May and the middle of July, with the beginning of May and the end of October as limits for all but casual observation. This brings up two recollections of the indifference of birds to temperature; a Semipalmated Plover in the late fall, after sunset, bathing for more than half a minute in a half frozen pool on a beach; and a herring gull at noon of a day in which the thermometer never was above ten degrees, stepping off a cake of ice in a harbor and bathing for nearly half a minute.

But in hot weather, is this bathing the reason for the mid-day absence of birds from their usual places? Who can say?

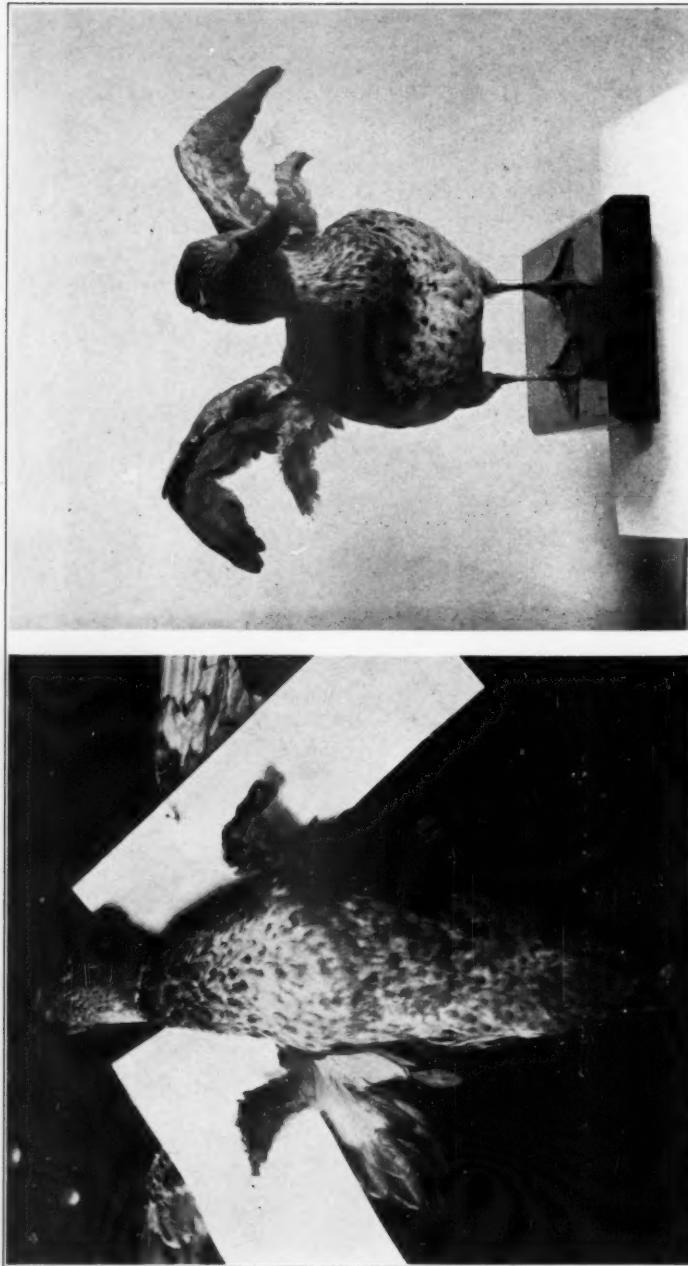


FIG. 1. IN THE FLESH.
FIG. 2. MOUNTED, CHAS. BRANDLER, TAXIDERMIST.

PHOTOGRAPHS OF FOUR-WINGED TEAL.

A FOUR-WINGED WILD-DUCK.

BY CHARLES EUGENE JOHNSON.¹*Plates XXVII-XXIX.*

ON November 18 last, the Zoölogical Museum of the University of Minnesota received through Mr. James Ford Bell of this city, a wild duck possessing a pair of supernumerary wings. The specimen had been shot by Mr. J. H. Stadon, of Minneapolis, a few miles west of Wyoming, Minnesota. While in Mr. Bell's possession, the specimen was examined also by the veteran ornithologist Dr. Thomas S. Roberts. The anomaly was considered sufficiently unusual and interesting to merit detailed study and publication.

Supernumerary parts in connection with the appendages of the body occur not infrequently among both vertebrates and invertebrates. Among vertebrates they appear in a variety of forms, such as supernumerary fingers and toes, tails, horns, mammae, earlike appendages, etc. There appear also the more complex anomalies known as "double hands," and "double feet;" and more rarely there is found an extra pair of limbs nearly entire in themselves, attached in the vicinity of a normal pair, with more or less abnormal condition of the girdle, but in a body in other respects normal. The relative frequency of such abnormalities apparently varies in different groups of vertebrates. Bateson ('94) in his extensive work, calls attention to the many cases of polydactylyism for instance, known in the horse, pig, and cat, and the complete absence of any records for the ass and very few for the sheep and dog. For the human species there is a rather extensive record of such cases. In birds, according to the same author, the total number of cases recorded is comparatively small. While in the domestic fowl polydactylyism is common, in other groups it is rare; in pigeons, ducks and geese it does not seem to be known.

In the literature accessible, I have found no record of any avian abnormality similar to the case to be here described. Broom ('97)

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records a "four-winged chick" but his specimen is of an entirely different character, possessing not only four wings but also four legs, and two tails. The spine is bifid, beginning at the base of the neck, and each spinal column has a corresponding pair of wings, a pair of legs and a tail. Diard ('97) reports a four-footed duck six months old. In this case there is a supernumerary pair of feet separate and distinct as far as the ankle joint, where each has its own articulation with a bifid enlargement at the end of a shaft of bone which apparently corresponds to fused tibio-tarsal elements of the two appendages. There is no distinct femoral segment differentiated, the feet being suspended from the previously mentioned shaft which articulates with the pelvis on the left dorsal side, at the junction of the *synsacrum* and *caudal vertebrae*. The feet themselves are abnormal. The left is larger and possesses three toes fully webbed; the smaller right foot has only two well formed webbed toes and an inner rudimentary digit. The fourth, posterior toe is lacking in each. The feet are furthermore somewhat deformed and atrophied and incapable of movement.

Tornier ('01) describes among other abnormalities three hens and two ducks, each with a pair of supernumerary legs appended to an abnormal pelvis. In addition to the accessory limbs, each of these specimens had two supernumerary *cæca* and the rectal segment of the gut was forked, presenting two cloacal chambers and anal openings.

The subject of the present paper is an adult female Green-winged Teal (*Nettion carolinense*). In a letter describing the circumstances in which the specimen was obtained, Mr. Stadon says:

"It may be of interest to know that the bird had no difficulty in flying but was peculiar from the fact that it flew out from some thick grass bordering a small creek back in the woods, whereas this species of duck, in my experience, more often stays along the protected shore of a lake when resting. Furthermore, I had not seen another Green-wing in that locality for at least two weeks before this one was killed. Pretty sure the rest of the species had migrated."

External features. The left wing of the normal or primary pair had been shot off at the elbow, otherwise the two sides are essentially alike in external appearance. When the primary wings are raised the supernumerary wings appear as a miniature set springing

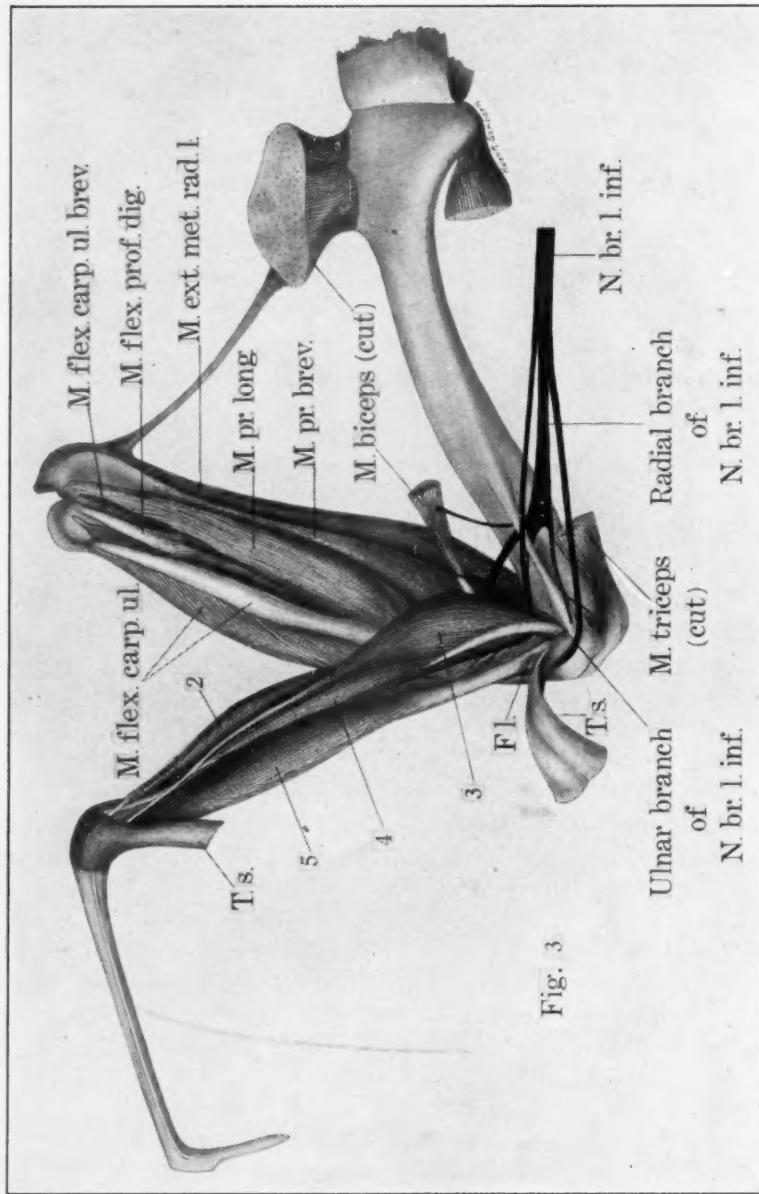


FIG. 3. DISSECTION OF MUSCLES AND NERVES OF THE RIGHT SIDE, FROM INNER ASPECT.

from the under side of the former at the region of the elbow, presenting corresponding surfaces and with divisions of forearm and hand clearly indicated. The feathery covering shows no modifications representing flight feathers but consists of under wing-coverts which belong primarily to the feather tracts of the normal pair. The broadly white-tipped posterior series of under wing-coverts of the primary wing continues onto the posterior margin of the supernumerary appendage while the rest of the latter is covered with the smaller, darker feathers of the anterior series.

The accessory wing of each side feels rigid at the elbow and has no movement independent of the primary wing. It is partly flexed at the point corresponding to the carpal region and here it can be felt that a slight movement is possible, but apparently complete flexion or extension can not take place. When the primary wings are folded in place against the body the tips of the smaller set project beyond their margins ventrally as a pair of inconspicuous feather tufts. The right projects a trifle further, and the integument covering its tip is scarred. The accessory wings may possibly during life have interfered somewhat with the folding of the larger pair though in the dead bird this is not apparent.

Skeleton. It is evident that in an abnormality like the present case any attempt to speak of homologies must result more or less unsatisfactorily. This applies to the bony parts as well as to the muscles, and while in the following account the supernumerary parts may be referred to in terms of normal structures it is not intended to convey the impression that homologies in any strict sense exist.

No abnormal features were found in the shoulder girdle. On the two sides the bony elements of the accessory wings are essentially alike from the elbow joint distally but the upperarm portions present markedly different conditions.

On the left side (Fig. 5) the distal end of the humerus of the primary wing is shattered. The remaining part of the bone is of normal shape. On the inner aspect of this bone, at the junction of the shaft with the head is a slender process of bone 7 mm. in length, extending roughly parallel with the shaft of the humerus. At its distal end the process passes into a slender, cylindrical, tendinous ligament 15 mm. in length, which continues toward the

elbow joint, and somewhat beyond the proximal half of the humerus, passes over into another bony process, similar to the first mentioned but longer, measuring about 18 mm. in total length. This process terminates in an enlarged headlike end, which, in life, was ankylosed on its lateral side to the median epicondylar region of the humerus of the primary wing by a rather narrow, low ridge of bone. The ligament, near its proximal end has a loop which evidently has resulted from tension exerted by the nerves to the biceps muscle, which lie in this loop. The median nerve passes distally between the ligament and the shaft of the humerus. The parts described, it will thus be seen, represent the imperfectly developed humerus of the left secondary or accessory wing.

On the right side, the humerus of the primary wing is somewhat stouter than that on the left. At about the middle of the shaft (Fig. 3) on its inner aspect, there becomes evident a rather narrow, rounded ridge of bone which further distally differentiates into a slender cylindrical shaft, terminating in an enlarged end similar to that of the left side, and ankylosed to the median epicondylar region of the primary humerus. This represents the humerus of the right accessory wing. At only one place does this shaft become entirely free from the primary humerus; here a narrow foramen is formed, about 6 mm. in length, transmitting a branch of the *Nervus brachialis longus inferior*.

The forearm skeleton is represented by a single bone. The general shape and articular relations are those of a radius rather than an ulna. It is set at an angle of about thirty-three and a third degrees with the corresponding humeral element, with the distal end of which it is firmly ankylosed. The bone measures 43 mm. in length, as compared with 50 mm. of the radius of the primary wing, and is approximately of the same diameter as the latter. The corresponding bone of the right side is practically identical in size and shape but is ankylosed at right angles to the upperarm segment. The exact relations of the left forearm bone to the primary humerus have been destroyed by the shot wound, but its lateral surface shows that an ankylosis has existed similar to that of the right side. The principal difference is that the left forearm bone forms a sharper angle with the two humeri. On the right side where the elbow articulations are intact, the accessory

forearm forms an angle of about forty degrees with the plane of motion of the primary forearm upon the upperarm, and evidently could offer no hindrance to the movements of the large wing in flight.

Distally, the forearm bone articulates with two small bony elements which from their position would seem to represent respectively the radial (Rad. carp.) and ulnar (Ul. carp.) carpal bones of the normal wing.

The carpal region of the right side possesses no separate radial element, but such a bone is possibly represented by a knob-like process on the metacarpal element, which forms the articulation with the radius.

The metacarpal skeleton consists of a single elongate, cylindric bone, somewhat enlarged at its proximal end. It is approximately two-thirds the length of the forearm bone. Articulating with the metacarpal bone and terminating the series is a single relatively short phalanx.

On the right side (Fig. 3) there is likewise but a single phalangeal element; it is slightly longer than the left and bent medially at right angles to the metacarpal element with which it is immovably ankylosed.

It will be seen in the figures that a different degree of flexion exists at the two carpal joints. While the joint surfaces here permit of motion, it is clear from the restrictions of the fascia about these joints, as well as from the inadequate muscle supply later described, that movement must necessarily have been very limited.

Muscles and nerves. Like the skeleton, the muscles of the two accessory wings present similar conditions from the elbow distally, but in the upperarm the left side alone possesses muscles and these are only two in number and of rudimentary character. Distad of the carpal region there are no muscles, but a tendon from one of the forearm muscles finds its insertion beyond this region.

The rudimentary muscles of the left upperarm are innervated by branches from the nerves to the biceps muscle of the primary wing. The nerve connections to the accessory forearm muscles of this side could not be positively made out on account of previous mutilation. The muscles of the corresponding right forearm receive their innervation from the *Nervus brachialis longus inferior*

(Fig. 3, N. br. 1. inf.). A single nerve enters the fleshy part of the forearm at its base, on the under side, and distributes to the various muscles. This nerve is formed by the union of two branches from the N. brachialis longus inferior, one of which accompanies the radial branch of the last named through the slit-like passage formed between the upperarm bones. No branch from the Nervus radialis was found to pass to the muscles of the supernumerary wing.

The ulnar branch of the N. brachialis longus inferior, instead of crossing the hollow of the elbow as in normal conditions, reaches its destination by passing around over the convex surface of the ankylosed elbow joint of the accessory wing.

With regard to symmetry, the arrangement of the muscles and nerves seems to indicate that the primary and accessory wings on each side are not related to each other as right and left, that is, as halves of the undivided wing; but that the smaller wing represents an imperfect copy of the larger.

On the left side two slender but well defined muscles are connected with the upperarm bone of the supernumerary wing. Both arise as offshoots from the biceps muscle of the primary wing; one from the posterior edge of the tendon of origin of the short head, near its attachment to the head of the humerus; the other from the ventral surface of the belly of the muscle at its proximal end. The fleshy part of the latter of these two muscles extends distally beyond the former, reaching nearly to the elbow joint. Here both insert by closely associated tendon slips, in the angle between the distal, bony process of the accessory humeral element and the corresponding forearm bone.

On the anterior face of the forearm bone lies a relatively large, dorso-ventrally flattened muscle (Fig. 4, 1) which arises by two short heads; one from the area of ankylosis between the forearm and the corresponding upperarm bones, on the outer anterior surface; the other from the anterior surface of the last named bone, adjacent to the ankylosis. The innervating branch from the N. brachialis longus inferior enters between the two heads. The muscle inserts for the greater part of its length on the forearm bone, extending distally as far as the last quarter of the shaft. In position, form and insertion, and in a general way in its origin, this muscle corresponds to the M. pronator brevis of normal wings.

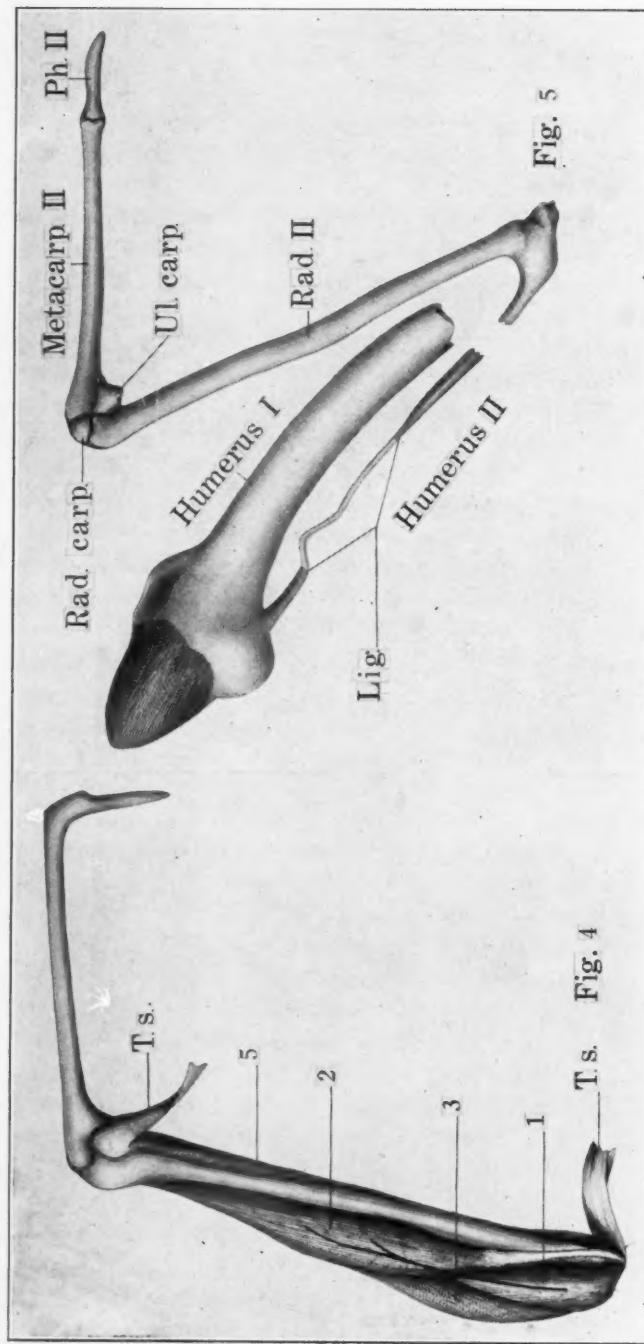


FIG. 4. MUSCLES OF RIGHT ACCESSORY WING, FROM OUTER ASPECT.

FIG. 5. PRIMARY HUMERUS AND SKELETON OF THE ACCESSORY WING OF THE LEFT SIDE. THE RUDIMENTARY HUMERUS WAS ACCIDENTLY BROKEN DURING DISSECTION.

To the outer side of this muscle is a spindle-shaped muscle (Fig. 4, 2) originating by a relatively long, narrow and flattened tendon from the outer, posterior surface of the ankylosis and passing distally, obliquely across the anterior surface of the forearm bone, to become inserted also by a relatively long, slender tendon on the anterior, inner surface of the proximal end of the metacarpal bone. The relations of this muscle closely approach those of the *M. extensor metacarpi radialis longior* of the normal wing, but the two well defined heads of the latter are here lacking. This muscle would have a pronating action upon the metacarpus in addition to the extending function. It is to be noted that the innervation of this muscle is by a branch from the *N. brachialis longus inferior*, while the *M. extensor metacarpi radialis longior* in the normal wing is supplied by the *Nervus radialis*.

On the under or medial surface of the ankylosed area there arises, partly by fleshy fibers and partly by a flattened tendon, a muscle mass which further distally is differentiated into two muscles, each with a long, slender tendon. One of these components (Figs. 3 and 4, 3) is proximal, and its tendon which is much the longer, passes to the under side of the wrist where it is held in place by a fibrous sheath, and thence courses along the under surface of the metacarpal bone to become inserted at the base of the phalanx. The other, more distal muscle becomes inserted into the fibrous capsule of the wrist joint, on its under side and anteriorly, where its tendon is held in place by the tendon of muscle 2. The first of these muscles has an insertion corresponding rather closely to the *M. flexor profundus digitorum*, the second to the *M. flexor carpi ulnaris brevior* of normal wings.

On the ulnar side of the under surface of the forearm is a superficial, broad, thickened, tendinous sheath (Figs. 3 and 4, T. s.). This sheath encloses the elbow joint of the supernumerary wing proximally, and about the middle of the forearm it separates into two bands which diverge, one passing to the outer side of the carpal joint where it inserts, and the other, a narrower band, passing to its insertion on the inner side of the joint. This tendinous sheath encloses a comparatively stout muscle, 5, which is exposed in its distal half by the division of the sheath. The muscle originates on the inner epicondylar region of the rudimentary upperarm bone by

a thickened fibro-cartilaginous ligament (Fig. 3, Fl.) about 6 mm. in length by 2 mm. in width, which strongly suggests the humero-ulnar pulley of the normal wing. The ligament is followed by a flattened tendon of origin and this, at about the second third of the forearm, passes into the muscular portion which has its insertion direct upon the entire posterior border of the ulnar bone of the carpus. Some fibers of the muscle arise from the inner surface of the enveloping tendinous sheath. This muscle occupies a position corresponding to that of the *M. flexor carpi ulnaris* of the normal wing.

Viewing the muscles of the abnormal wing as a whole, one may fancy the arrangement as an attempt to dispose of the muscles formed, in a manner as closely approaching the normal plan as the skeletal conditions of the case and the muscle material available would permit.

The question of causes. With regard to the causes underlying the formation of supernumerary digits or limbs in nature, it may be said that our knowledge is very meager. That supernumerary structures of this kind may be artificially induced in some of the lower vertebrates, often with constant and predictable results, has long been established. And that such parts occur in nature from causes analogous to those of the experimental laboratory is doubtless true; but it is also undoubtedly true that a great many cases occur which are entirely independent of such external causes.

As Barfurth ('95) has pointed out, a number of investigators have held the theory — and he calls this the atavistic theory — that polydactylism represents a "throw-back" (Rückschlag) to an older primitive type of limb which possessed more than five digits. This, because it had been observed that the accessory digit occurred especially in connection with either the first or the last digit of the normal series, and a like supernumerary digit was often known to occur in the same individual on both hand and foot, and was inheritable. Bardeleben, Wiedersheim and others, for instance, assumed that the primitive mammalian limb was not pentadactyl but heptadactyl. Still others pointed further back to the rays of an ancestral fin type.

It would indeed seem that if, in an animal where the normal digital condition for its particular group represents a reduction in

number from the pentadactyl type of its class, the full number of five digits should abnormally occur, these accessory digits might in reality represent a reversion to the ancestral type; as for example, when a fifth finger occurs in some urodelous amphibians which normally possess four fingers.

A second view is that of double embryonic anlagen. Here the normal anlage has become divided either through some extrinsic perhaps mechanical agency, or through an intrinsic peculiarity of the germ-plasm.

According to a third view, the supernumerary digits or limbs are simply malformations or pathological growths that belong in the category of duplicate formations (Doppelbildungen) which first arise as germinal variations, and are inheritable.

In the efforts of the various authors holding the views just mentioned, Barfurth finds a more or less evident tendency to assign all cases of supernumerary digits etc. to a common cause. He, himself, believes that they result from a variety of causes.

Among external influences the amnion is considered by some authors as the cause of accessory appendages. Tornier ('97) considers it an established fact that amniotic folds or bands are responsible for some cases of supernumerary digits or limbs in mammals; that this is true not only where such parts occur on one side of the body, but also where they appear on both sides, similar and simultaneous. He cites the case of a pig's foot in the Zoölogical Institute of the University of Leipzig, in which he declares one may follow out in detail the history of the processes by which the end result was produced. According to his view an amniotic band or fold may press against the pelvis or a shoulder blade of the embryo in such a way that a portion becomes pinched off; or a swelling or protuberance arises in which a process of regeneration sets in, producing a structure that in greater or less degree is a duplicate of the part from which it sprang; or a growing limb bud may be split by the penetration into it of such folds or bands. Tornier based his conclusions upon a study of both birds and mammals.

Opposed to this view in regard to the influence of the amnion stand the observations of Kaufmann-Wolf ('08). In an extensive study on the domestic fowl in adult and in embryo, this investigator found no evidence that the embryonic membranes, amnion

or allantois, play any part in the formation of polydactylism, and believes that these membranes cannot be adduced as causative factors in the production of such anomalies. Painstaking search in embryonic stages showing incipient polydactylism — one series in particular having the embryonic membranes faultlessly preserved — failed to suggest the possibility of amniotic influence. Furthermore the early appearance of the anlage of the supernumerary digits, at a time when the foot-plate possesses no indentations whatever, speaks against such external agency and justifies the view that if in any other amniote, in much later stages, amniotic bands or folds are found in the clefts between supernumerary digits, they have invaded the depressions secondarily. Kaukmann-Wolf holds the view that polydactylism is due to internal influences which in our present state of knowledge cannot in detail be satisfactorily analyzed.

In certain amphibians which possess notably marked capacity for regeneration, such as Siredon and Triton, Barfurth, and Tornier ('97) produced with regularity supernumerary limbs by means of more or less complex amputations and other forms of injury, the accessory parts being here produced by regeneration at the wound surfaces. From the results of his experiments Tornier concluded that embryonically initiated extra digits or limbs in Anamnia are due to influences analogous to those produced by the embryonic membranes of Amniota; that is, to some stress producing a warping, twisting or splitting of the developing part, thereby inducing regenerative processes or complete division. In both vertebrate groups Tornier thus believes that the underlying causes are of external nature.

From the opposing views here briefly outlined it will be seen that the problem of causes is far from a satisfactory solution.

In regard to the case recorded in this paper it would seem that the embryonic membranes must be excluded as causative factors. The fact that the radial branch of the N. brachialis longus inferior lies between the primary and accessory upper arm bones, indicates that the latter of these bones is not the result of a splitting off from an originally normal embryonic humerus by the ingrowth of an amniotic band, or other mechanical agency, for in that case we should expect to find the nerve which precedes the skeletal parts in

development, mesiad of the accessory element; and there is no reason to believe that the distal and proximal parts of the supernumerary wing are not the result of the same cause. Furthermore, it seems improbable that complications in the embryonic membranes should arise on the two sides simultaneously, of such nature as to produce substantially identical results. Taking this anomaly as a whole, the extent to which the entire wing is involved, the imperfect separation of the accessory upper arm bone, the absence of other impressions and disturbances in adjacent soft parts which one might expect as a result of such agencies, there seems to me no basis for believing that embryonic membranes have here been implicated directly or indirectly. What other extrinsic agencies acting merely on the skeletal anlage of the wing alone, or upon the wing-bud as a whole, might have produced the conditions found, are difficult to imagine. The more probable view for this case, it appears to me, is that it resulted from some inherent abnormality of the anlage of the extremity, of germinal origin.

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NOTES ON DICHROMATIC HERONS AND HAWKS.

BY OUTRAM BANGS.

IN the Proceedings of the Biological Society of Washington, Vol. XXV, pp. 53-58, Oberholser gives a detailed account of the so-called *Butorides brunescens* (Lembeye) of Cuba and the Isle of Pines and emphatically states his belief that it is a true species quite distinct from the Cuban form of *Butorides virescens* with which it sporadically occurs in the two islands just mentioned. He admits that in size and proportion it exactly agrees with the ordinary Green Heron of Cuba.

Theoretically I have always held the opposite opinion. There is nothing about *Butorides brunescens* that suggests specific distinction to me, everything seeming to point rather to this peculiar form being nothing more or less than an erythristic phase of plumage of *Butorides virescens*.

Up to now, extreme examples of the *brunescens* phase of plumage have been recorded only from Cuba and the Isle of Pines, although as stated by Thayer and myself, and by Oberholser, many specimens from the Pearl Islands, Bay of Panama, show a very decided approach to it, some being nearly as extreme as Cuban skins. In a series of twenty-two specimens from the Pearl Islands, just one half show more or less of this erythristic tendency. The other half of the series (eleven skins) is made up of birds in absolutely normal plumage — quite indistinguishable so far as color and markings are concerned from typical examples of *Butorides virescens*.

Peters, Auk, Vol. XXX, p. 370, described at some length a youngish green heron, M. C. Z. no. 60699, taken by himself at Camp Mengel, Quintana Roo, Mexico, February 7, 1912, that shows decided erythrisim and that closely approaches the *brunescens* type of coloration.

Lately while cataloguing that part of the Howe-Shattuck collection of birds which was transferred from the Boston Society of Natural History to the Museum of Comparative Zoölogy, in a long series of Green Herons from Florida, I found one adult female in

extreme *brunescens* plumage. This skin, now M. C. Z. no. 72982, was taken March 22, 1902, at Madeira Hummock, Florida, and was in beautiful, fresh spring plumage. Its neck is a little darker than in specimens in normal plumage, is unicolor lacking all traces of either whitish or dusky markings even on the throat and chin; the belly is dark and reddish and but slightly contrasted against the color of the neck; the wing-edge has no whitish on it whatever; the wing coverts are all very narrowly edged with dark rusty brown, with no creamy or whitish anywhere. It affords the following measurements—wing, 166 mm.; tail feathers, 53; tarsus, 51; exposed culmen, 62.

Unfortunately the measurements taken from this example are not positive proof that it was bred in Florida. The chance however, of its having wandered from Cuba to where it was killed seems rather remote, and I regard it as pretty certainly an instance of erythrism of the continental Green Heron—*Butorides virescens virescens* (Linn.). In his Revision of the subspecies of the Green Heron (Proc. U. S. Nat. Mus., Vol. 42, pp. 529-577) Oberholser gives in his list of measurements, the length of wing in females of *B. virescens virescens*, as ranging from 160 to 185. In females of his *B. virescens cubanus* from 155 to 174. The Cuban form does, of course, average smaller in all measurements than *B. virescens virescens*, but single individuals cannot be separated, if their measurements happen to fall—as in the case of the specimen I have just described—between the extremes.

Cory's Least Bittern, *Ixobrychus neoxenus* (Cory), is a similar case of nothing more or less than erythrism of the common Least Bittern, *Ixobrychus exilis* (Gml.) as I have wholly satisfied myself by an examination of specimens, which vary among themselves as to the degree of erythrism shown. It crops out, here and there, anywhere, within the range of the species, and has no distinct range of its own.

Another dichromatism common among herons, and now thoroughly well understood, is the very striking one, of a pure white—albinistic—phase, and a normally colored,—usually bluish and reddish—phase shown by the same species. The three species showing this extraordinary tendency, and now admitted by nearly all systematic ornithologists to be dichromatic, are the Red-

dish Egret of America, *Dichromanna rufescens* (Gml.) whose white phase has been named *D. pealei* (Bp.). In some places, especially in some of the Bahamas, this species presents a mixed plumage, partly white and partly blue, called by Maynard *Ardea rufa mutata*. The Reef Heron, *Demigretta sacra* (Gml.) of the coasts and islands of the Indian and Pacific Oceans; and the Little Blue Heron, *Florida caerulea* (Linn.). In this latter species the white dress is usually a sign of immaturity, and is changed, for a blue one as the bird becomes fully adult. But this is not always the case. I have myself seen birds breeding in the white plumage, and fancy that such individuals retain the white dress throughout life.

Albinism, melanism and erythrism are of course but manifestations of an abnormal condition of pigmentation, and as such are directly inherited. Thus, miscolored forms of this kind may appear to have geographic limitations, similar to those of real subspecies.

All these facts being perfectly well known, and all other Herons showing dichromatism having been finally treated as such by ornithologists, it seems to me extraordinary that the Great White Heron of Florida should still be dealt with as though it were a species.

There is an accumulation of evidence now, both printed and on the labels of museum specimens, to show that *Ardea occidentalis* Aud. and *Ardea herodias wardi* Ridg. breed together freely. We also have an intermediate form in *Ardea würdemanni* Baird, that is very variable, sometimes shading toward the blue phase, sometimes toward the white phase. All three are of exactly the same size and proportions, and show no specific characters except color, which I consider has no real significance in such a case.

In Cuba and the Isle of Pines a Great White Heron also occurs, associated with birds in normal plumage,— *Ardea repens* Bangs and Zappey. This form can be separated from the Great White Heron of Florida by its lesser dimensions. In size and proportions it exactly agrees with the Great Blue Heron of the West Indies, the white phase of which I unhesitatingly pronounce it to be.

I should therefore propose to change the standing of some of the American Herons as follows—

Ixobrychus neoxenus (Cory) must become a synonym of

IXOBRYCHUS EXILIS (Gml.).

Ardea herodias wardi Ridg. and *Ardea würdemanni* Baird both become synonyms of

ARDEA HERODIAS OCCIDENTALIS Aud.

The West Indies Great Blue Heron, becomes

ARDEA HERODIAS REPENS Bangs & Zappey,

with *Ardea herodias adoxa* Oberholser as a synonym, and the Cuban Green Heron, if really distinct from *Butorides virescens maculatus* (Bodd.), of Martinique, which I doubt, becomes,

BUTORIDES VIRESSENS BRUNESCENS (Lemb.)

with *Butorides virescens cubanus* Oberholser a synonym.

The Hawks, now admitted by, I think, all bird anatomists to be close relations of the Herons, show an array of color variation due to melanism, erythristism and even albinism, such as no other group of birds presents. The melanistic forms are so common, have been so much discussed and are so well known that I shall pass them by entirely here.

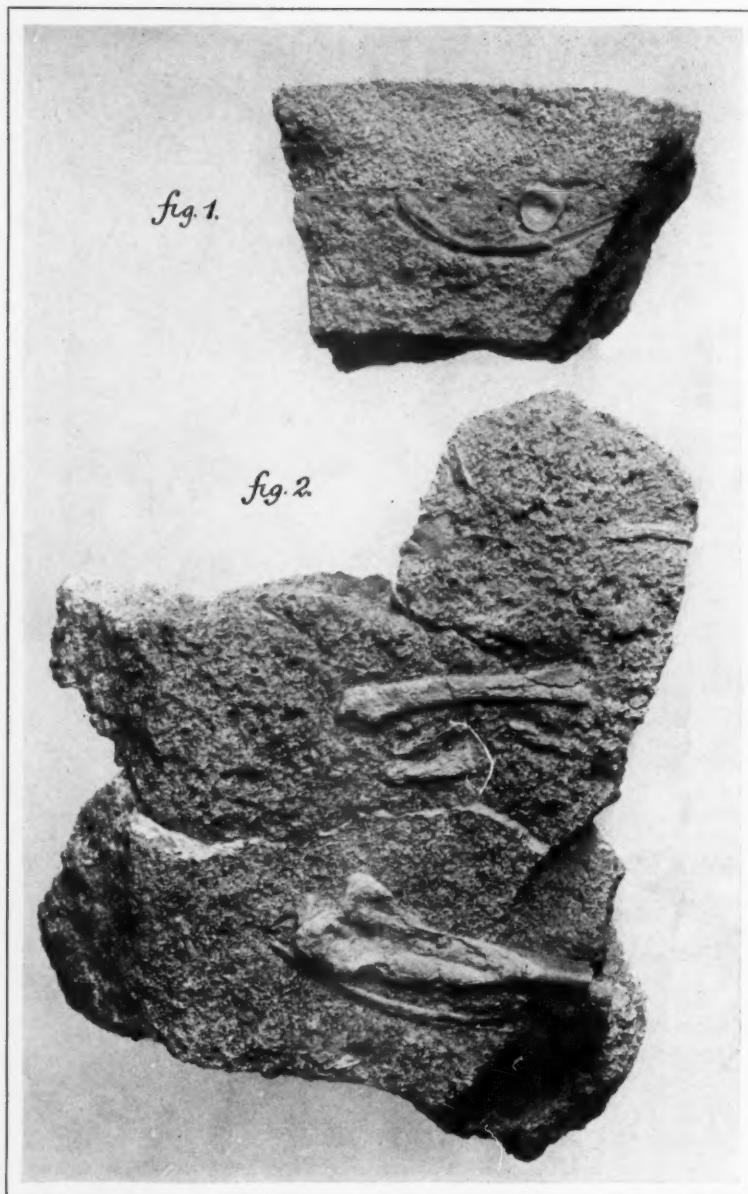
The most sharply marked instance of dichromatism, that I know in the Hawks, that is due to erythristism, is in the Cuban Sparrow Hawk, *Falco sparverius sparveroides* Vig. In Cuba and the Isle of Pines, the normally colored pale birds and the reddish brown, erythristic examples, are about equally common, occur everywhere together, and breed, mated indiscriminately.

An instance of albinism in the Hawks, which on account of the tendency of the causes of this disease to be inherited, gives the bird a semblance of geographical limitations like those of a subspecies, is the famous white Goshawk of Kamchatka and parts of east Siberia, *Accipiter¹ gentilis albodus* (Menzb.). This bird has recently been discussed at length by Hartert, (Die Vögel der paläarktischen Fauna, Vol. II, p. 1149), who points out that normally colored birds do occur with it, as well as all intermediate stages, and who considers it only an albinistic phase of *Accipiter g. schredowi* (Menzb.).

I have no doubt myself that the White Goshawk of Australia, *Accipiter nova-hollandiae* (Gmel.), is an albinistic phase of *Accipiter cinereus* (Vieill.) with which it occurs in the same regions.

¹ *Astur*, of course, if one wants to recognize that genus.

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FOSSIL REMAINS OF EXTINCT CORMORANT, *Phalacrocorax macropus*,
FROM MONTANA.

FOSSIL REMAINS OF THE EXTINCT CORMORANT
PHALACROCORAX MACROPUS FOUND IN MONTANA.

BY R. W. SHUFELDT, M.D.

Plate XXX.

CHARLES H. STERNBERG was the first one to discover the fossil bones of a large extinct cormorant in the Pliocene formation of Oregon. These bones belonged to a number, or rather represented a number of individuals of different ages and probably both sexes. Subsequently, Cope described this extinct cormorant and named it *Graculus macropus*.¹

Several years afterwards, under the name *Phalacrocorax macropus*, I reexamined the thirty-four parts of fossil bones of the collection made by Sternberg, and compared them with the corresponding ones in several species of existing cormorants found in the avifauna of the United States. A table of measurements was also made and presented.² Including the two metacarpi that originally belonged in the Condon collection, there were four more or less imperfect specimens of that bone of the skeleton represented, while none of these fragments were figured on the plates.

Thus our knowledge of this cormorant stood up to the ninth of July, 1913, when the American Museum of Natural History of New York City issued its 'Bulletin' containing my "Review of the Fossil Fauna of the Desert Region of Oregon, with a Description of Additional Material Collected there." (Vol. XXXII, Art. vi, pp. 123-178. Pls. ix-xliii, figs. 1-578.) In this work I refer to what was formerly set forth in the Philadelphia Academy memoir, and the remark is made that "The present reexamination of the material tends to confirm this latter opinion; and, as the fossil bones of *P. macropus* have never been illustrated, I have devoted four plates and many figures to them in the present paper."

¹ Cope, E. D. Bull. U. S. Geol. and Geogr. Surv. of Terr., Vol. IV, No. 2 (1878). pp. 386, 387.

² Shufeldt, R. W. "A Study of the Fossil Avifauna of the Equus Beds of the Oregon Desert." Jour. Acad. Nat. Sci. Phila., Vol. IX, Pls. xv-xvii, Phila., Oct., 1892, pp. 389-425.

With respect to the present article, the bones which interest us here are to be found on Plate xxi of the aforesaid 'Bulletin' (figs. 262-264), and they represent different fragmental parts of three carpometacarpi of an adult *Phalacrocorax macrourus*. Figs. 262 and 263 are of *left-side* bones, the first being rather more than the proximal moiety; fig. 264 is of the distal portion of a carpometacarpus from the right side. The latter does not especially interest us in the present connection, while figs. 262 and 263 distinctly do, as I shall show further on in this paper.

Up to include the early part of the year 1915, no fossil remains of *Phalacrocorax macrourus* had been discovered outside the State of Oregon, and if they had, such a discovery was not known to science. Early in February of that year, Mr. Charles W. Gilmore, of the Division of Vertebrate Palaeontology of the United States National Museum, referred some fossil bone material to me for examination, reference, and publication. This material consisted of one large and two smaller pieces. (Figs. 1 and 2, Plate XXX.) The largest fragment and the one next in size to it had been repaired by sealing them together with plaster-of-paris, — an excellent piece of work done by one of Mr. Gilmore's assistants at the museum. A few fossil and imperfect bones were firmly fixed in the matrix of the latter piece, the principal one apparently being the rib of some teleostean fish; these bones do not concern us here. On the twelfth of February, 1915, I photographed the two other fragments, natural size, and in such a way as to show the fossil bones the fragments contained. (See Plate XXX.) It will be observed that the smaller fragment presented in it a vertebra and a rib of some adult teleostean fish of the period, which may or may not be known to science, and only interest us here from the fact that they occur in connection with the fossil bird bones found in the largest fragment (Fig. 2). These, with the other specimens, were collected by Mr. C. M. Bauer on the twenty-fifth of October, 1914, while employed by the United States Geological Survey in southeastern Montana. Mr. Bauer was in charge of this collecting party at the time in question, and in noting this specimen he entered the following remarks in his record (p. B 62): "Fish Bones. Locality T. 53 R. 60 E. North Side Cottonwood Creek: Base of Arikaree. Oct. 25, '14." Mr. Gilmore has catalogued this specimen at the

National Museum under number 3251, and informs me that it is from the Lower Miocene formation.

Passing now to an examination of the large fragment shown in Fig. 2 of the Plate, I must first deplore the fact that whoever collected this specimen apparently labored under the impression that all the fossil bones in the matrix were those of some fish, and not sufficiently perfect to be of any use to the palaeontologist. He therefore, very evidently, did not bring in all that he could have brought, and probably would have, had he known or appreciated their real value.

All the specimens of fossil bones in this largest fragment are those of some large bird or other. They consist of a rib, the proximal part of a left carpometacarpus; a large phalanx from a bird's foot; also a small, pedal joint, and other pieces too fragmentary to identify. These fossil bones I believe all belonged to the same adult individual, with the possible exception of a rib, which may be a fish's rib, though I am much more inclined to believe it to be a costal rib of the same individual.

The carpometacarpus has its direct anconal aspect exposed, the shaft being hollow and crushed inwards for its upper portion. This bone is the key to the species which the specimens represent. Before making any comparisons, I pronounced that the bird represented was a specimen of *Phalacrocorax macrourus*; and as a matter of fact, and as subsequently proven, this upper portion of a carpometacarpus agrees exactly, in the matters of measurement, proportions, characters, and form with the corresponding fragment of a carpometacarpus of *Phalacrocorax macrourus* mentioned in a former paragraph of this paper. (Fig. 262, Bull. Amer. Mus. Nat. Hist., July 9, 1913.)

It is the largest bone in the matrix shown in Fig. 2 of the Plate of the present paper. The one next in size is evidently the long, proximal joint of the hallux (of one or the other of the feet) of this cormorant. Its dorsal aspect is exposed, and its distal end is opposite the proximal end of the carpometacarpus in the fragment. It agrees with this bone of the foot in average existing cormorants, apart from being considerably larger. There is no other bone in the skeleton of any cormorant (*Phalacrocorax*) with which it can be confused; and this is the first instance of this particular bone in

the skeleton of a *Phalacrocorax macropus* having come into the possession of science.

Finding this bird in Montana will prove, up to date, that it probably was an abundant species during Pleistocene time and earlier, ranging over a considerable portion of the northwestern section of Middle North America, or at least that portion of this continent now so named.

No little interest also attaches to the fact of finding these remains associated with the fossil bones of a highly specialized teleostean fish, if fish it be, which lived during the same era that this extinct cormorant described by Cope did.

THIRTY-THIRD STATED MEETING OF THE AMERICAN ORNITHOLOGISTS' UNION.

BY JOHN HALL SAGE.

THE Thirty-third Stated Meeting of the American Ornithologists' Union convened in San Francisco, Cal., Monday evening, May 17, 1915. The business meeting was held at the California Academy of Sciences, and the public sessions, commencing Tuesday, May 18, and lasting three days, were held in the Auditoriums of the Young Women's Christian Association and of the Eiler Musical Company, within the Exposition Grounds.

BUSINESS SESSION. The meeting was called to order by the President, Dr. Albert K. Fisher. Eleven Fellows were present. The Secretary's report gave the membership of the Union at the opening of the present Stated Meeting as 1156, constituted as follows: Fellows, 50; Retired Fellows, 3; Honorary Fellows, 13; Corresponding Fellows, 56; Members, 79; Associates, 955.

Since the last meeting (April, 1914) the Union lost fifty-four members, nine by death, eighteen by resignation, and twenty-seven for non-payment of dues. The deceased were:

Dr. Theodore Nicholas Gill,¹ a Retired Fellow, who died in Washington, D. C., September 25, 1914, in his 78th year; Graf Hans von Berlepsch, an Honorary Fellow, who died February, 27, 1915; Otto Herman, of Budapest, Hungary, a Corresponding Fellow, who died December 27, 1914; and the following Associates: Mrs. Clara E. Buxbaum, who died in Chicago, Illinois, March 23, 1914; William Bardwell Burke, who died at Rochester, New York, April 15, 1914; William Charlesworth Levy, who died at Alton Bay, N. H., July 5, 1914, aged 26 years; William Foreacre Brantley, of Blackshear, Ga., who died September 9, 1914; Prof. Lewis Lindsay Dyche, of Pratt, Kansas, who died January 20, 1915, at the age of 58 years, and Harry Kirkland Pomeroy,² who died in Kalamazoo, Mich., January 27, 1915, in the 50th year of his age.

The report of the Treasurer showed the finances of the Union to be in a satisfactory condition.

All the officers were re-elected, as follows: Albert K. Fisher, President; Henry W. Henshaw and Witmer Stone, Vice-Presidents; John H. Sage, Secretary; Jonathan Dwight, Jr., Treasurer; Ruthven Deane, William Dutcher, Joseph Grinnell, Frederic A. Lucas, Wilfred H. Osgood, Chas. W. Richmond, and Thos. S. Roberts, members of the Council.

Dr. Emilia Snethlage, of the Museu Goeldi, Pará, Brazil, was elected a Corresponding Fellow; Edwin R. Kalmbach, and the Hon. George Shiras, 3d, of Washington, D. C., were elected to the class of Members, and the following sixty-eight persons were elected Associates:

E. M. Anderson, Provincial Museum, Victoria, B. C.
Miss Mary Adeline Ayres, Medford, Mass.
Merle Taft Barker, Taunton, Mass.
C. Stanley Benson, North Abington, Mass.
Ralph Benton, Los Angeles, Cal.
Wolfrid Rudyerd Boulton, Jr., Beaver, Pa.
W. C. Bradbury, Denver, Colo.
Herbert William Brandt, Cleveland, Ohio.
Maurice Graham Brooks, French Creek, W. Va.

¹ For an obituary notice, see *Auk*, XXXII, pp. 139-140; also *Memorial Address* in the present number.

² For an obituary notice, see *Auk*, XXXII, p. 386.

Ronald K. Brown, New York City, N. Y.
Mrs. Florence Buckwalter, Union, Miss.
Clarence H. Bush, DeKalb, Ills.
Charles Edgar Conklin, Roslyn, N. Y.
Hugh Conn, Cochrane, Ont.
Frederick W. Cook, Seattle, Wash.
Miss May Thacher Cooke, Washington, D. C.
Chas. P. Curtis, Boston, Mass.
Lewis Dexter, Manchester, N. H.
Eric B. Dunlop, Winnipeg, Manitoba.
Russell Errett, Terrace Park, Ohio.
Erik Fries, Montclair, N. J.
Charles Gleason, Brookline, Mass.
Ralph Mather Harrington, Cambridge, Mass.
Arthur Thacher Hinekley, Niagara Falls, N. Y.
Wharton Huber, Gwynedd Valley, Pa.
Miss Dorothy C. Hunt, New York City.
Mrs. Edwin H. Husher, Los Angeles, Cal.
Roland Fountain Hussey, Ann Arbor, Mich.
H. H. Kopman, New Orleans, La.
John Edward Harry Kelso, M. D., Edgewood, B. C.
Leslie W. Lake, Hamburg, N. Y.
John L. Lawrence, Lawrence, N. Y.
Mrs. William M. Levey, Brookline, Mass.
Edward G. Lund, Boston, Mass.
Thomas L. McConnell, McKeesport, Pa.
Miss Gertrude McDowell, Atlanta, Ga.
James Latimer McLane, Jr., Garrison P. O., Md.
Edward Sidney Marks, Arlington, N. J.
Jesse C. A. Meeker, Danbury, Conn.
Samuel W. Mellott, Chevy Chase, Md.
Miss Bertha Stuart Miller, Palisade, N. J.
William Henry Mousley, Hatley, Quebec.
Alva Morrison, Braintree, Mass.
Prof. William H. Munson, Winona, Minn.
Dr. I. D. Nokes, Los Angeles, Cal.
Neill Pennell Overman, East Orange, N. J.
Lloyd Peabody, St. Paul, Minn.
Arthur Wellesley Perkins, Farmington, Maine.
G. Planton Middleton, Philadelphia, Pa.
James C. Quiggle, Washington, D. C.
Harvey Darel Radetsky, Denver, Col.
Mrs. A. A. Saunders, New York City.
Edmund Joseph Sawyer, Watertown, N. Y.
Chas. F. Schermerhorn, Des Moines, Iowa.
Chas. P. Shoffner, Philadelphia, Pa.

O. P. Silliman, Castroville, Cal.
Napier Smith, Montreal, Canada.
Theodore L. Squire, Battle Creek, Mich.
F. A. Stuart, Marshall, Mich.
Mrs. Phillip B. Stewart, Colorado Springs, Colo.
Phillip B. Stewart, Colorado Springs, Colo.
Francis Thomas Sujak, Chicago, Ill.
Henry H. Townshend, New Haven, Conn.
Dix Teachenor, Lawrence, Kansas.
Roy A. Ward, Washington, D. C.
Belle Williams, Columbia, S. C.
Lem Williams, Shonkin, Montana.
Miss Clara Lucretia Willis, Waban, Mass.

Drs. Palmer, Stone, and Richmond, Prof. Cooke, and Ruthven Deane, were appointed 'Committee on Biography and Bibliography.'

The amendments to the By-Laws, proposed at the last Stated Meeting of the Union, were unanimously adopted. Members will hereafter share with Fellows the business of the Union and the election of Officers, Members and Associates.

PUBLIC SESSIONS. First Day. The meeting was called to order by the President, Dr. Fisher.

The papers of the morning were as follows:

'Notes on the Life-History of Penguins, with Special Reference to the Origin of Certain Instincts,' by Robert Cushman Murphy. Illustrated by lantern slides.

'Oregon Bird Life in Motion Pictures,' by William L. Finley.

The following papers were presented at the afternoon session which was held at the Auditorium of the Eiler Musical Company, in the Palace of Liberal Arts.

'Philadelphia to the Coast in Early Days, and the Development of Western Ornithology prior to 1850,' by Dr. Witmer Stone.

'In Memoriam — Theodore Nicholas Gill,' by Dr. T. S. Palmer.

'The Migration of Albatrosses and Petrels,' by Leveritt Mills Loomis. Remarks followed by Dr. Palmer, Messrs. Murphy and Nichols, and the author.

'A Late Nesting Record for the California Woodpecker,' by Mrs. Harriet Williams Myers.

'The Average Age of the Herring Gull,' by John Treadwell Nichols.

In the evening the members of the Cooper Ornithological Club and the A. O. U., with their friends, met at dinner at the Clift Hotel — fifty persons being present.

Second Day. The meeting was called to order by Vice-President Stone.

The papers of the morning session were:

‘Some Breeding Birds of the Grand Canyon,’ by Dr. T. S. Palmer.

‘Immature Plumages,’ by Dr. Jonathan Dwight, Jr. Remarks followed by Mr. Loomis, the author, and the Chair.

‘The Shore Birds of California,’ by William Leon Dawson. Illustrated by lantern slides.

The noon-day luncheon was served at the Chop Suey Restaurant in the Food Products Building, within the Exposition Grounds.

At the afternoon session Joseph Mailliard, President of the Cooper Ornithological Club, occupied the Chair. The following papers were presented:

‘Exhibition of the Salisbury Wild Life Motion Pictures,’ by Dr. Harold C. Bryant.

‘Farallon Island Bird Life, in Motion Picture,’ by P. J. Fair.

‘Niche of the California Thrasher,’ by Dr. Joseph Grinnell. Remarks followed by Dr. Palmer, Mrs. Myers, Mr. Dawson, and the author.

Third Day. The meeting was called to order by President Fisher.

The papers of the session were:

‘The Genus Problem in Present Day Nomenclature,’ by Dr. Witmer Stone.

‘The Work of the National Association of Audubon Societies,’ by T. Gilbert Pearson.

‘Two Characteristic California Waders: The Black-necked Stilt and the Snowy Plover,’ by Tracy I. Storer. Illustrated by lantern slides. Remarks followed by Messrs. Murphy, Dawson, and Joseph Mailliard.

‘Food Habits of the Road-runner, *Geococcyx californicus*,’ by Dr. Harold C. Bryant. Illustrated by lantern slides.

In the absence of the authors the following papers were read by title:

‘The Pacific Coast Races of *Thryomanes bewickii*,’ by Harry C. Swarth.

'History of the Bohemian Waxwing in Northern British Columbia,' by Ernest M. Anderson.

Resolutions were adopted thanking the Young Women's Christian Association and the Eiler Musical Company for the use of their auditoriums for a place of meeting, and for other courtesies extended; to Mr. J. Eugene Law and other members of the Southern Division of the Cooper Ornithological Club for generous hospitality and courtesies extended to the eastern members of the Union and their friends, during their stay in Los Angeles; to the Local Committee of the A. O. U., and the members of the Northern Division of the Cooper Ornithological Club for generous hospitality and many courtesies extended to the Union during its Thirty-third Stated Meeting; and to the United States Bureau of Fisheries for the use of the steamer "Albatross" for a trip about San Francisco Bay and around the Golden Gate.

The Stated Meeting just closed was the first regular meeting ever held on the Pacific Coast, and it will be remembered by those in attendance as one of the most successful in the history of the Union.

On Friday, May 21, after adjournment of the Union, some seventy-five members of the California Academy of Sciences, the Cooper Ornithological Club, and the A. O. U., enjoyed a trip about San Francisco Bay and around the Golden Gate on the U. S. Fish Commission Steamer "Albatross." Dr. Barton W. Evermann, Director of the California Academy of Sciences, acted as host. The same day other members of the Union visited Mt. Tamalpais and the Muir woods.

Later in the month many of the eastern members were entertained by Dr. and Mrs. C. Hart Merriam at their attractive summer home in Lagunitas.

The next meeting of the Union will be held in Philadelphia in 1916, the date to be determined by the local committee.

JOHN H. SAGE,
Secretary.

GENERAL NOTES.

Yellow-billed Loon (*Gavia adamsi*) in Colorado.—A Correction.—In writing the life history of the Yellow-billed Loon, I have been puzzled to know what to do with the supposed Colorado record of this species. I have always suspected that the record was based on an erroneous identification, as Colorado is so far away from the known range or migration route of this species.

The specimen on which it was based was taken by Mr. William G. Smith, near Loveland, Colorado, on May 25, 1885. A letter from Mr. Smith to Major Bendire, giving the details of its capture, is now in my hands and states that the bird was sold to Mr. Manly Hardy of Brewer, Maine, now deceased.

Knowing that the Hardy collection had been recently purchased for the Rhode Island Audubon Society and was now in the Park Museum in Providence, I wrote to my friend, Mr. Harry S. Hathaway, of that city, for his opinion, as to the identity of the specimen. He very kindly investigated the matter and sent me his report, together with a letter on the subject from Mrs. Fanny Hardy Eckstorm, which strengthened my doubts and practically convinced me that the record was based on an error. For my own personal satisfaction, I went to Providence and examined the specimen with Mr. Hathaway. It is not a Yellow-billed Loon, but a very curious specimen of the Common Loon and I am not surprised that Mr. Hardy, and others who have seen it, have been puzzled. Its entire plumage is decidedly worn and faded to a dull brownish shade. It is a young male in the immature plumage of the first year. Its bill is certainly yellow, the yellowest, or lightest colored, bill I have ever seen in any young loon, which probably led to its identification as *Gavia adamsi*; but the size and shape of the bill agree with *Gavia immer* and not with *G. adamsi*. The culmen measures about 3.20 in. and the depth of the bill at the base is about .90 in. Ridgway's 'Manual' gives, for *G. adamsi*, culmen 3.50 to 3.65 in. and depth, 1.00 to 1.20 in.; and for *G. immer*, culmen 2.75 to 3.50 in. and depth .90 to 1.05 in. The bird in question is small even for *Gavia immer* notwithstanding the fact that it is a male, and it has a particularly slender bill, even for that species, instead of the large, heavy bill, with the straight culmen so characteristic of *Gavia adamsi*. It is only fair to Mr. Hardy to say that he was in doubt about the bird and that the record never ought to have stood without verification. I cannot understand why some one, who was competent to identify the bird, did not examine the specimen before the record was published, which would have prevented the frequent repetition of an error, which can never be wholly rectified. Such errors are far too common and I hope that this one will be corrected in the next edition of our Check-List.—A. C. BENT, Taunton, Mass.

The Puffin (*Fratercula arctica arctica*) on Long Island, N. Y.—On April 30, 1915, a specimen of this species was found on the beach near Montauk Point and was sent to me for identification. The body of the bird was very much decayed and it may have perished several weeks before it was found. This appears to be the third record for Long Island.—J. A. WEBER, Box 327, Palisades Park, N. J.

A Near View of an Iceland Gull.—As notes on the Iceland Gull (*Larus leucopterus*) in life are rather scarce, the following observations on its appearance and actions may be worth recording. I found a bird of this species January 2, 1915, at the fish pier, South Boston. It was alternately swimming about and resting in the slip on the west side of the pier, and I watched it for some time with my bird-glass (of three diameters), part of the time within ten or fifteen yards, I should think. It was in the rare pure-white plumage (at least nothing but pure white could be seen on the most careful study under these favorable conditions) and the bill appeared to be entirely black, or blackish. It was clearly smaller than the Herring Gulls with which it was associated, and the bill, as always with this species, was noticeably shorter in proportion, giving a somewhat dove-like appearance to the head. It also carried its head higher and the tail, or rather the rear part of the body, cocked at more of an angle. The wings extended farther beyond the tail than was the case with the Herring Gulls. It was livelier and more "aristocratic" and graceful in bearing than these, and made pretty little dabs with its bill at morsels of food in the water. It appeared to be on terms of equality with the Herring Gulls and was always near them or among them. It had two or three little tiffs with them over food, but these were no more frequent than the quarrels among the Herring Gulls themselves. This bird was afterwards seen at the same place by Dr. Charles W. Townsend, and this or a similar pure-white Iceland Gull was observed at close range off Rockport, Mass., April 19, 1915, by Mr. Charles R. Lamb, who permits me to report the occurrence.—FRANCIS H. ALLEN, West Roxbury, Mass.

The Arkansas Kingbird (*Tyrannus verticalis*) in Eastern Minnesota.—While out on a bird-hunting trip with my class in ornithology on May 12, 1915, we saw an Arkansas Kingbird on the boulevard of Minnehaha Creek not far from Lake Harriet. There could be no doubt as to the identification, since he was in plain sight and the lemon-colored underparts were described by all the members of the class. This is the second time within a year that I have seen an Arkansas Kingbird in the neighborhood of the Twin Cities. Since the 'A. O. U. Check-List' names western Minnesota as the eastern boundary of the range of this species, while Hatch in his 'Birds of Minnesota' does not mention the bird at all, I thought the record might be of interest.—PROF. PAUL E. KRETZMANN, PH.D., Concordia College, St. Paul, Minn.

Starlings (*Sturnus vulgaris*) in New Hampshire.—Four Starlings were seen at Hanover, N. H., on April 17, 1915. As this is the first time these birds have been seen here, I thought the record might prove of interest.—
E. GORDON BELL, Hanover, N. H.

Bachman's Sparrow near Chicago, Illinois.—The scene of this discovery is not Chicago proper, but the suburb of River Forest. Near my home in this fine suburb is an eighty acre tract of land, which I call "Waller's Park," for although a piece of real estate held for speculation, it is in reality a beautiful park, as it has been surrounded by the owner with an eight foot fence and for over twenty-five years planted up with many kinds of trees and bushes, so that, besides having in the course of these years become a park, it is also an ideal bird preserve or sanctuary, unintentional as this phase of the project may have been on the part of the owner. On May 9 I went into this idyllic spot, which, however, had up to this time not been resorted to by flights of migrants as much as would be expected, owing to the unseasonably cool or cold weather. The temperature for May recorded by the Chicago weather station was two degrees lower than that for April, if I am not mistaken, the coldest May since the establishment of the office. After seeing several Palm Warblers, Ruby-crowned Kinglets, Field Sparrows, Baltimore Orioles and the here inevitable Cowbirds, my attention was suddenly arrested by an unusual song. On going to that part of the grove from which it came, I noticed ten to fifteen reddish sparrows, which were busily feeding on the ground among the grass and then, as though they could not keep their exhilaration for themselves or that it could not be given vent to on the ground, some would mount to the lowest branches of the adjacent trees and pour out a ringing song. The song resembled that of the Chewink at its best and also that of the Field Sparrow, being, however, louder than the latter and sweeter than the former. Approaching to within fifteen feet of several of the singers, I saw that they were Bachman's Sparrows (*Peucaea aestivalis bachmani*), a species with which I had become familiar during a stay in southern Illinois. It was hard to believe, but looking them over again and again, with and without the glass, one could, also by elimination, arrive at no other conclusion, which was corroborated by the skins in my collection when I came home. That flock stayed there, in the same spot, for several days, for I saw them again on May 12. Knowing that this species is one of those which are gradually extending their breeding range northward, I still thought that these birds would not remain to breed, for the gap between here and the nearest locality to the south from which they are reported as breeders, would be too great. I thought they had in their migratory ardor been carried along by other sparrows until they found themselves farther north than they wished to go, and would retrace their flight fifty or more miles southward. However, on May 23, I noticed one again which behaved very much as though it were at home. On June 29 and 30, I heard two

singing lustily in the open grove opposite my home, which is two blocks east of the park described above. Wishing to clinch the record I, on July 1, took one, which proved to be a male, whose enlarged testes made it certain that it had been or was breeding. Therefore Bachman's Sparrow must be looked upon as an, at least occasional, breeder in the Chicago area.
— G. EIFRIG, *Oak Park, Ill.*

Leconte's Sparrow in Wisconsin.—Under this title in the January number of 'The Auk,' Mr. Schorger notes the occurrence of Leconte's Sparrow (*Passerherbulus lecontei*) at Madison in April of last year. In Wisconsin the species is undoubtedly an unusual one, at least on the spring migration, but, despite the fact that Kumlien and Hollister failed to get it in spring, there are several records from various points in the state since the publication of 'The Birds of Wisconsin.' Attention is called to a note by Mr. I. N. Mitchell (Bulletin of the Wisconsin Natural History Society, vol. VIII, No. 3, July, 1910), which covers these, and consists of three spring records. Mr. Schorger says: "On April 11, 1914, three were taken and one seen at Madison." Curiously enough, the writer took a full plumaged male at Oconomowoc, Wisconsin, on the same date!—A. R. CAHN, *Univ. of Wis., Madison, Wis.*

Junco Breeding in Concord and Lexington, Mass.—*Junco hyemalis hyemalis* has been generally considered a bird characteristic of the Canadian fauna. Its ordinary distribution in Massachusetts during the breeding season embraces the lofty hill country of the western part of the State, and a narrow elevated strip of land running south from Mt. Monadnock, N. H., into Worcester Co., Mass., and forming the water-shed which divides the tributaries of the Connecticut from those of the Nashua River. In this strip are included the rounded mountain domes known as Watatick (1847 ft.) and Wachusett (2016 ft.). I recall but three instances of Junco breeding in the eastern part of the Atlantic slope of Massachusetts, viz.: in Middlesex Fells (Eustis, Auk, xxii, 103, Jan. 1906), Wellfleet, Barnstable Co. (Remick, Auk, XXIV, 102, Jan. 1907), and Wellesley, Norfolk Co. (A. P. Morse, Pocket List of the Birds of Eastern Massachusetts, p. 64, 1912).

In the latter part of May, 1915, Mr. C. A. Robbins called my attention to a pair of Juncos established on the edge of Sleepy Hollow Cemetery in Concord, and on the 6th of the following June Dr. W. M. Tyler and I watched both of the parent birds as they were busily employed in carrying food to their young, concealed in the branches of some tall white pines.

On the 20th of the same month Dr. Tyler and I found another pair feeding fledged young near the old Paint Mine in Lexington, about six miles from the Concord locality. This family of birds was seen by us at the same place on several occasions up to the 18th of July.—WALTER FAXON, *Lexington, Mass.*

The Indigo Bunting in Colorado.—A male of this species (*Passerina cyanea*) was seen by the writer at Brighton, Colo., on August 15, 1915.—W. H. BERGTOLD, *Denver, Colo.*

Numerous Migrant Pine Warblers (*Dendroica vigorsii*) at Fort Lee, N. J.—In the southern part of this locality the coniferous growth was cut away many years ago and it is therefore not suited to the requirements of the Pine Warbler. Ten years or more of migration notes by the writer in this locality show only one or two migrant warblers of this species during a spring flight. The number observed this spring is therefore noteworthy, *viz.*—

April 19, 1915—1 ♂; April 20, 1915—15 ♂, 5 ♀; April 21, 1915—4 ♂, 4 ♀; April 24, 1915—1 ♂; May 6, 1915—1 ♀. Total 21 ♂, 10 ♀.—J. A. WEBER, *Box 327, Palisades Park, N. J.*

Black-throated Blue Warbler in Colorado.—The writer has to record the presence of a male of this species (*Dendroica carulascens carulascens*) in Cheesman Park, Denver, Colo., where it was seen during the whole of June 13 and 14, 1915. It is such an extremely rare visitor to this State that the writer slipped into his home (only a few yards away) and took a skin of this species with him while he again watched the living bird as it flitted about in the evergreens. The writer is extremely sceptical about the correctness of many sight identifications, especially of these rare warblers when reported from Colorado, and hence he took the precaution to study the living bird and a skin simultaneously; it was deemed all the more necessary to take this precaution as the writer has not seen the living bird or heard its song in nearly twenty-five years.—W. H. BERGTOLD, *Denver, Colo.*

Cape May Warblers Destructive to Grapes on Long Island.—With much interest I read of the actions of the Cape May Warbler (*Dendroica tigrina* in recent numbers of 'The Auk.') These warblers were especially abundant here last fall and there were twenty or more on our place from September 20 to October 10. They might be found at all hours of the day in the grape arbor, where they were observed to puncture the grape skins with their bills and drain out the juice.—JAMES W. LANE, JR., *St. James, L. I.*

The Resident Chickadee of Southwestern Pennsylvania.—Attention should be called to a mistake during past years in regard to the resident Chickadee of that region of southwestern Pennsylvania that lies south of central Washington County and east of the first mountain ridge of Fayette County.

During the writer's earlier ornithological investigations he was led to believe that the Black-capped Chickadee (*Penthestes a. atricapillus*) regu-

larly inhabited this region. This belief was due the identifications of a local oölogist, who sent out sets of eggs, taken here, labelled as *Penthestes a. atricapillus*.

The truth is that the species found with us is the Carolina Chickadee (*Penthestes c. carolinensis*). In order to prove this statement the writer has made a careful study of specimens from various parts of the region and has yet to find one *Penthestes a. atricapillus*. Breeding birds were examined as follows: A nest found May 1, 1915, was built in a cavity made by the birds in the top of a decayed fence post. This post stood in a creek valley and was at the side of a lane which wound about the base of a steep wooded hillside. The female bird was captured on the nest and proved to be *Penthestes c. carolinensis*.

A second nest, discovered May 8, was built in a cavity at the top of a fence post which stood on the border of a field and at a public roadside. The female was lifted from six slightly incubated eggs and carefully examined; she was a typical specimen of *Penthestes c. carolinensis*. Locality: One mile north of the West Virginia line.

A third nest, found on May 9, was situated in a top of a fence post. This stood on the border of a village. The birds were seen to change places on the nest and one was captured and examined. It proved to be *Penthestes c. carolinensis*. Locality: Blacksville, West Virginia, a small town lying on the Mason and Dixon Line.

Breeding birds were examined in the region of Washington, central Washington County, and also found to be *Penthestes c. carolinensis*.

In order to further establish proof as to the species found here I have asked two West Virginia ornithologists to inform me as to the species found in their respective regions. Rev. Earl A. Brooks of Weston, West Virginia, who has studied the bird life of many parts of his state, says that *Penthestes c. carolinensis*, is the species inhabiting the hill country of northern West Virginia. He informs me that only in the higher mountain regions has he found *Penthestes a. atricapillus*.

Mr. George M. Sutton, ornithologist at Bethany College, in the Panhandle of northern West Virginia informs me that the species found there, since his arrival a year ago, is *Penthestes c. carolinensis*. He adds that only once has he noted the Black-cap: in the late fall of 1914.

Mr. W. E. Clyde Todd in charge of the birds at the Carnegie Museum, Pittsburg, Pa., tells me that there is a specimen of *P. c. carolinensis* in the museum collection which was taken near Washington, Pa. He says that he is not surprised to learn that the Carolina Chickadee dwells in this region.—SAMUEL S. DICKEY, Waynesburg College, Waynesburg, Penn.

Winter Birds at Wareham, Mass.—It may be of interest to record at Wareham, Massachusetts, during the past winter, the following species:

VESPER SPARROW, *Poocetes gramineus gramineus*, two.

CHIPPING SPARROW, *Spizella passerina passerina*, three.

FIELD SPARROW, *Spizella pusilla pusilla*, rather common.

CATBIRD, *Dumetella carolinensis*, one.

BROWN THRASHER, *Toxostoma rufum*, one.

All were present throughout the entire period, with the possible, though hardly probable, exception of the Vespers, which were not found until February 26, 1915.—C. A. ROBBINS, *Onset, Mass.*

Notes on some Manitoban Birds.—Taking E. T. Seton's list of Manitoban birds in the 'Handbook of the British Association,' Winnipeg, 1909, as a basis, the following observations appear to be worthy of record.

Sterna caspia. CASPIAN TERN.—On June 22, 1914, I found about 120 pairs of Caspian Terns nesting on a small shoal in a remote part of Lake Winnipeg. Laying had commenced shortly before for there were many single eggs and the full clutches which were tested were fresh or nearly so. The only other species nesting on the shoal was a single pair of Herring Gulls, they had evidently taken toll of the Terns eggs. Later in the summer photographs of the birds nesting were obtained from a blind, they proved to be very shy, no doubt the absence of bushes from the shoal and consequent conspicuousness of the birds, partially at all events, account for this. Both sexes incubate. Seton gives no record of this species.

Phalacrocorax auritus auritus. DOUBLE-CRESTED CORMORANT.—In Chapman's 'Birds of Eastern North America,' the number of eggs laid by this Cormorant is given as 2-4. On Lake Winnipeg I found many fives and sixes and also several sevens, the frequency of these occurrences made it certain that they were true clutches and not the product of more than one bird.

Marila marila. GREATER SCAUP DUCK.—As there appears to be no definite record of this species nesting in Manitoba, I may state that it was undoubtedly the most plentiful breeding duck, mid-way up the west side of Lake Winnipeg. Full clutches were not found till the middle of June.

Lobipes lobatus. NORTHERN PHALAROPE.—Noted on the Dauphin River near Lake St. Martin on August 16, 1914, and also on a shoal in Lake Winnipeg, September 4, 1914.

Tryngites subruficollis. BUFF-BREASTED SANDPIPER.—Two secured on west shore of Lake Winnipeg, September 5, 1914.

Squatarola squatarola. BLACK-BELLIED PLOVER.—Seton has no autumn records. Several birds of this species were frequenting the mouth of the Mossy River, Winnipegosis, at the beginning of October, 1914.

Ægialitis meloda. PIPING PLOVER.—A nest of this species found on June 18, 1914, on the shore of Lake Winnipeg contained four eggs. Young of this species were subsequently seen at other points on the same lake.

Perisoreus canadensis canadensis. CANADA JAY.—A curious superstition that I found prevalent among the Indians in various parts of

Manitoba was that if they happened to find a nest of this species containing eggs or young, either they themselves or a near relative would soon die. Nothing would induce the Indians to search for nests of this species.

Passerherbulus nelsoni nelsoni. NELSON'S SPARROW.—This species was found about midway up the west shore of Lake Winnipeg on July 11, 1914. No doubt it was breeding there.

Penthestes hudsonicus hudsonicus. HUDSONIAN CHICKADEE.—As there is only one record of this species for the Province, that of Macoun for Porcupine Mountains, it may be well to state that I noted it at two places on the west shore of Lake Winnipeg on July 17 (an immature bird) and on September 6. I also noted it at Lake St. Martin on October 26, 1914.—ERIC B. DUNLOP, *Winnipeg, Manitoba.*

Bird-Notes from Cambridge, Isanti County, Minnesota.—Isanti county is situated in the southern part of east-central Minnesota, and is at one point only eight miles distant from the St. Croix River—in this vicinity the boundary between Minnesota and Wisconsin. Its northern boundary is about thirty miles south and slightly southeast of Mille Lacs Lake, which is midway between the northern and southern extremities of Minnesota. The size of the county is small compared with the others in this state, its area being only 456 square miles. In shape it is practically a square from which two townships placed north and south of each other have been cut out from the northeast corner. The adjoining counties are: Kanabec on the north, Mille Lacs and Sherburne on the west, Anoka on the south, and Chisago on the east.

The greater part of the county is drained by the Rum River and its tributary streams which are all small brooks and brooklets issuing from nearby lakes. Rum River rises in Mille Lacs Lake, flows southward through Mille Lacs, Sherburne, Isanti and Anoka Counties and unites with the Mississippi at Anoka. Entering Isanti County about five miles south of the middle of the western boundary, it flows northeastward about fifteen miles, turns abruptly southward and leaves the county about eight miles east of the southwest corner. Cambridge is situated five miles south of the vertex of the angle formed and is near the river. The course of the river is winding as may be shown by the fact that (according to the State Drainage Commission) there are fifty-two miles of river in this county. Its fall is very slight, only eleven inches per mile, the altitude of the river surface ranging from 891 to 939 feet. The river valley is bordered by side hills ranging as high as sixty feet above the level of the river. These sometimes rise directly from the water's edge in the form of bluffs but usually are farther in the background, giving space for ample meadows in which graceful bayous or "ox-bows" delight the eye. However, the southeastern projecting corner of the county and the extreme northeast and northwest corners are drained by small tributaries of the St. Croix. There are numerous lakes of varying size usually small, Green Lake, the largest one,

having only a square mile or more of surface. The precipitation at Cambridge is between twenty-nine and thirty inches.

Cambridge lies about five miles north of midway between the 45th and 46th parallels of latitude. The surrounding country is gently rolling and as a whole is of a sandy character. The black heavy loam which we find in the southern parts of the state is here totally absent and consequently such lovers of a fertile soil as the bloodroot and bellwort are here not nearly as common. In many places we find extensive black oak barrens where only black and bur oaks will grow to represent the trees but where the Pasque Flower, the pioneer of early spring startles us with its beauty when we pass through its haunts. The aspens, oaks, birches and red maples form the bulk of the more fertile upland wooded areas, while soft maples, white ashes and elms clothe the river bottomlands. Logging has ceased to be a large industry although a few sawmills are still running to accommodate those farmers who haul in their sled loads of logs to be sawed into lumber.

Cambridge seems to lie on the very southern edge of the Canadian life area of this state. Here we find large tracts of Tamarack bogs covered with a thick layer of peat-moss where the Reindeer-lichen, Labrador Tea, Leather-leaf, Rosemary, Pitcher-plant and Sundews grow in profusion. White Spruces grow abundantly in some places, intermingling with the Tamaracks and from whose dead limbs hangs the long waving *Usnea* and other lichens in which the Northern Parula Warbler may occasionally be found nesting. The mossy mounds and old hoary stumps are covered with mats of the Twin-flower and creeping Snowberry, and several species of Cypripedium grow as well. These swamps are the paradise of Orchids and Heaths. A grove of Balsam Firs grows in the northwest corner of the county at Maple Ridge, and extensive patches of White Pine are found throughout the northern half. In the larger patches the drowsy, buzzing song of the Black-throated Green Warbler can be heard all through the heat of midsummer. Jack Pines grow fairly commonly in some places but are usually under twenty-five feet in height. The leaves of the *Clintonia* cover the ground around the borders of the bogs. In hot sandy soil around some lake shores and in the pines we find the ground matted with Bearberry one of the few plants to be found growing in these situations. Wolves are still quite common in the Tamarack bogs and rarely the bear is met with. The Great Plains fauna is represented by the Jack Rabbit and Brewer's Blackbird.

So far as I know, very little if any study had ever been made of the avifauna of this county before I began my observations here in 1913. These were all made within a radius of seven miles of Cambridge. The following list is intended to give some of the observations which may be most interesting to other Minnesota bird students. With these explanatory paragraphs they are submitted as follows:

1. ***Cryptoglaux funerea richardsoni.*** RICHARDSON'S OWL.—I have two records in 1914 for this boreal bird. One was a female shot and brought

to me on January 31 and the skin of which I have. The other was observed March 1 and was remarkably tame. In wooded bottomland by the river.

2. **Picoides arcticus.** ARCTIC THREE-TOED WOODPECKER.—November 1—February 28. Common in winter in tamarack bogs but they can also be found in any kind of woods. Their presence is usually betrayed by a sharp "kip" which they utter at irregular intervals. Tamaracks are their favorite trees and often they will peck off the dead scaly bark the whole length of a tree to get at the borers underneath. The fact that I have no summer records and that they are so common in winter shows that they migrate somewhat south of their breeding range, in winter, through the tamarack belt.

3. **Euphagus cyanocephalus.** BREWER'S BLACKBIRD.—Since colonies of this species have been found near Minneapolis it was no great surprise to me to find another colony in a meadow just east of the station at Grandy five miles north of here on June 30, 1915. It consisted of at least five pairs and during my brief visit there two fledglings were seen able to make extensive flights.

4. **Zonotrichia albicollis.** WHITE-THROATED SPARROW.—Summer resident, April 18—November 9. Common in summer in tamarack and spruce woods. All day long their clear whistle can be heard if we are near their haunts. One nest with five almost fresh eggs on June 4, 1915. Their breeding range does not probably reach much further south than Cambridge.

5. **Spizella pusilla pusilla.** FIELD SPARROW.—In hot sandy places covered with black and bur oaks, this bird was found to be not at all uncommon, although very local. Often two or three can be heard answering each other. A nest with three young and a Cowbird was found on June 16, 1914.

6. **Melospiza melodia melodia.** SONG SPARROW.—My notes contain two wintering records for this bird. On December 8, 1913, I was surprised to hear the characteristic call-note of this bird in a weedy fence-row entering the south side of a tamarack forest and a little search revealed the bird. It was seen again in the same place on several occasions up to January 8 which was the last time it was observed. Again, this winter (1914—1915), one was seen on an average every other day between November 17 and January 12, after which period I did not see it again. It seemed to make its headquarters every night in the willows bordering an "oxbow" a quarter of a mile north of Cambridge. From this place it made frequent trips to feed on the weed seeds on a neighboring hillside and field. I scattered food for it regularly in several places. On December 4 I was surprised to find two birds instead of one, but with that exception only one was seen. Still another bird was observed on the east side of a tamarack bog two miles north of this village on December 19, 1914.

7. **Protonotaria citrea.** PROTHONOTARY WARBLER.—Six miles west of Cambridge and about one mile above Findell Bridge, the river has at some time changed its course, leaving now only a small stream of water to flow through its former channel which is called "Lost River"

and follows a winding path parallel to the new one for a distance of about a mile. At the point where they reunite, the river flows out into large sloughs, losing all semblance of its usual appearance, and affording a favorite feeding ground for herons. In the tall elm trees between "Lost River" and the main channel there is a herony of at least twenty pairs of Great Blue Herons. This place resembles in all respects though on a smaller scale, the river bottoms of the Mississippi in southeastern Minnesota where the Prothonotary Warbler occurs so abundantly. Even a slight rise in the river will drench it with a foot of water in many places and at all times there is a network of muddy streams to be forded by the intruder. Here we find old decayed stumps, logs and fallen trees which often give natural bridges across the streams. In such a place it was small wonder that the Prothonotary was found breeding, and its clear ringing song associated with that of many Redstarts, was a familiar sound there. I found at least five pairs though there may have been more and also located a nest on June 17, 1915, with three eggs. The most northern point at which they had been found hitherto was four miles below Hastings on the Mississippi: about sixty miles further south.¹ Therefore the birds here form an isolated colony.

8. **Vermivora chrysoptera.** GOLDEN-WINGED WARBLER.—A fairly common summer resident, May 11—September 25. Isanti County seems to lie near the northern limit of their range. They frequent hot, open second growth where hazelnuts grow in abundance.

9. **Vermivora celata celata.** ORANGE-CROWNED WARBLER.—The breeding range of this species is supposed to reach only as far south as Manitoba. I was greatly surprised, therefore, to find one singing in the willows and alders bordering the sloughs at the mouth of "Lost River" on June 11, 1915. It was very confiding so that I could approach quite close to it while it was singing and could plainly see the obscure streaks on the breast; as it was preening its plumage the brownish bases to the feathers on the crown could even be seen. I am thoroughly familiar with the Nashville, Orange-crowned and Tennessee Warblers and their songs so I have no doubt that it was the Orange-crown although the specimen was not collected. It seems probable that it was breeding there, though of that I am not certain.

10. **Dendroica vigorsi.** PINE WARBLER.—Very common in the pines in the northern parts of the county. Often only two or three large pines near farmhouses will shelter a pair of them.

11. **Oporornis agilis.** CONNECTICUT WARBLER.—Summer resident, May 18—? This interesting species was found to be common in summer in the tamarack and spruce bogs where its loud, liquid song was a dominant sound in the morning and evening hours. In the middle of the day they are much less in evidence since they are then preoccupied in walking about in the damp moss and undergrowth searching for insects. They display

¹ Roberts, T. S. Auk, Vol. XVI, No. 3, July 1899, pp. 236—246.

very little shyness but instead a great deal of curiosity, and if the observer is still they will come very close to him and sing. On June 26, 1915, Dr. T. S. Roberts and I saw a female with her bill full of food in the spruce swamp north of Cambridge.

12. **Oporornis philadelphicus.** MOURNING WARBLER.—A few may be seen and heard singing here in summer in the second growth of rich woods. This species like the last is very tame while singing and chooses some dead limb in full view from which to deliver its loud song. May to September.

13. **Certhia familiaris americana.** BROWN CREEPER.—Permanent resident. A few winter in the tamarack and spruce woods where they are protected from cold winds. In the heavily wooded bottomlands by "Lost River" I saw a pair on June 11, 1915. The scaly bark which was peeling off the old soft maples gave suitable nesting sites and the birds' anxious call-notes indicated that they had a nest near by.

14. **Regulus satrapa satrapa.** GOLDEN-CROWNED KINGLET.—Last winter (1914-1915), this bird was found to be quite common throughout the cold months in the pine and spruce woods, where its penetrating "ti-ti" betrayed its presence for some distance through the clear, frosty air. It was supposed to be very rare and sporadic in southern Minnesota in winter.

15. **Hylocichla guttata pallasi.** HERMIT THRUSH.—In the extensive pine woods bordering tamarack swamps northeast of Grandy, at least three Hermit Thrushes were heard singing this summer (1915) whenever I visited that locality. This is the most southern summer record thus far for Minnesota.—LAWRENCE L. LÖFSTRÖM, Cambridge, Minn.

RECENT LITERATURE.

Dall's Biography of Baird.¹—Twenty-seven years have elapsed since the death of Prof. Baird, and while numerous tributes to his scientific attainments and achievements have been published, no biography at all commensurate with his position in the development of science in America, has hitherto appeared. This was undoubtedly due to the fact, well known to Prof. Baird's friends, that his daughter Miss Lucy Hunter Baird was engaged upon such a work with the aid of Prof. G. Browne Goode, assistant Secretary of the Smithsonian Institution during her father's incumbency as secretary. Prof. Goode's death and the recurrent illness and ultimate

¹ Spencer | Fullerton Baird | A Biography | Including Selections from his Correspondence | with Audubon, Agassiz, Dana, and others | By | William Healey Dall, A.M., D.Sc. | with nineteen illustrations | [vignette] | Philadelphia & London | J. B. Lippincott Company | 1915. 8vo. pp. i-xvi + 1-462. \$3.50 net.

death of Miss Baird hindered the progress of the work, but a provision of Miss Baird's will arranged for its completion and publication and her executor has displayed admirable judgment in selecting for the task Dr. Wm. H. Dall, long time associate and friend of Prof. Baird and who, to use his own expression, was personally familiar with most of the occurrences of the last twenty years of Prof. Baird's life.

Miss Baird's contribution to the biography is considerable; consisting of her personal recollections of various incidents and periods in her father's life, together with matter obtained from other members of the family or friends covering earlier events in his career. The biographer had also the neatly bound volumes of correspondence which Prof. Baird had carefully preserved and which comprised letters from almost every prominent American scientific man of the period, as well as of many distinguished in other fields of learning. Baird's own letters to his brother William and to several other correspondents were also available as well as his journal.

From such rich material it was possible to construct a virtual autobiography with contemporaneous discussion of the interests and activities of the subject, and this Dr. Dall has done, welding together his materials in a masterly way, interpolating the original letters with excellent judgment and producing not only a splendid exploitation of the life of the naturalist, but a volume of absorbing interest to the reader, whether he be scientist or layman. We feel sure moreover that the one who would appreciate the labors of the author, more perhaps than can any one else, would have been the devoted daughter of the great naturalist to whom the volume is inscribed.

Prof. Baird's position in American scientific circles was unique. No other naturalist was probably acquainted with such a large number of scientific men or held in more universal esteem. His personal qualities were such as endeared him to all with whom he came in contact, and the generous cordiality and affection of his correspondents is reflected in many of the published letters. His influence upon American scientific development was of the utmost importance. From his early youth the idea of amassing specimens was ever foremost in his mind, first as a private collection, then as a great government museum, and as we turn the pages of the biography his selection as Assistant Secretary and then as Secretary of the Smithsonian Institution appears simply a matter of course, so perfectly was the man fitted for the position. In training his scholars in the College at Carlisle, where he was a professor, in methods of collecting specimens, and later in furnishing more elaborate instructions and outfits to the young naturalists who came to the Smithsonian, to army officers and to the staff of the Government surveys, he started a sort of endless chain which reached far into the future producing collectors and collections increasingly skilled and valuable as years went on.

Through the entire volume one is impressed with the tireless energy of the man, collecting and studying birds, fishes, mammals, reptiles, fossils, minerals and plants; preparing specimens for exchange, keeping up an

extensive correspondence and encouraging others to collect for him besides mastering language after language even to Danish and Italian, and reading all the scientific works upon which he could lay his hands.

The community of interest between Spencer F. Baird and his elder brother William, as shown in their correspondence, at once attracts the sympathy of the reader, and the generosity of the older brother when he found himself able to extend financial assistance to the younger to aid his advance in a field which he himself had been forced to abandon, is very touching.

The correspondence with Audubon is extremely interesting, forming, as it were, the connecting link between the leading figure of one epoch of American Ornithology and that of the next. Also the numerous exchanges of letters with John Cassin especially those of Christmas, 1853, wherein they reckoned the number of years that they had been friends and the high value that they placed upon this friendship! Later amid increasing cares we trace Baird's career at Washington, his establishment of the International Scientific Exchange, the development of the Museum and the fatherly interest in the many young naturalists who made the Smithsonian the centre of their activities and organized the Megatherium Club.

Finally the development of the Fish Commission and its numerous activities. But it is useless to try to present a synopsis of such a life; one must read it in its entirety, and suffice it to say that every ornithologist — indeed every scientific man — should read this biography. It is instructive in its mass of historical details, inspiring in the example that it sets and the possibilities that it opens up, and fascinating as a piece of literature. The illustrations are good and well selected, and the book is in every way a credit to both author and publisher.— W. S.

Baynes' 'Wild Bird Guests.'¹ — When interest in the preservation of wild birds first developed in this country, our efforts were almost entirely directed to stopping their killing, and to keep all disturbing agencies away from their haunts. Of late years however this work has advanced along quite different lines and it has been shown that it is possible not only to make the birds' haunts more suitable for their needs but also to attract birds to places where they were almost or quite unknown before. In the fore front of this movement Mr. Ernest Harold Baynes has been the most conspicuous figure, and in the volume before us he tells of his methods and results, placing before a larger audience the facts that are familiar to the many who have heard his lectures or have been associated with him in 'bird club' work.

¹ *Wild Bird Guests. How to Entertain Them. With Chapters on the Destruction of Birds, their Economic and Aesthetic Values, Suggestions for Dealing with their Enemies, and on the Organization and Management of Bird Clubs.* By Ernest Harold Baynes. With 50 photogravure illustrations from photographs. New York. E. P. Dutton & Company, 1915. 8vo. pp. i-xviii + 1-326. \$2 net.

Mr. Baynes' book is more than this however. It passes in review the whole subject of bird destruction — by man, by natural enemies and by disease,— presenting the subject in an entertaining way, not as a list of dry statistics, and quoting his facts from a wide range of reliable authorities. He admirably differentiates the "true" and "so-called" sportsman. The former "is fond of the woods and fields and streams and lakes and who when game and fish are plentiful likes to get a little for himself or a friend, but who, when game shows signs of decreasing, does his best in every way to protect it and insure its increase." The latter "shoots all the birds the law permits him to, even when he knows the law is unfair to the birds. If there is no law to stop him he kills all the birds he can, and resorts to the use of automatic and pump guns, because it is not 'sport' but birds that he is trying to get."

Economic, aesthetic and moral reasons for protecting the birds are next reviewed, and finally in the last six chapters the author launches forth in his own particular field, that of attracting the birds, upon which topic he is easily our leading authority. The chapter headings give a good idea of the method of treatment; 'Entertainment in Winter,' 'Hospitality the Year Round,' 'Bird Lovers as Landlords,' 'Bird Baths,' 'Problems Confronting Beginners,' and 'Bird Clubs.' Under these headings we learn of the best foods for wild birds in winter time and methods of distributing them during time of heavy snow. Feeding boxes and winter shelters are also exhaustively considered. Then come lists of trees, shrubs and vines attractive to birds, and plans for nesting boxes, drinking basins and baths of all kinds. Mr. Baynes advocates shooting of English Sparrows and Red Squirrels but adds: "it is not for children. It is hard work — unpleasant work — and should be done by real men who know the bird from all others." He says further, "I know one man, who with a twenty-two calibre rifle, has for years kept his home farm of a hundred acres, clear of red squirrels, house cats and European Sparrows." The task of ridding a given place of bird enemies becomes increasingly easy. In one case "200 squirrels were shot the first year, perhaps 50 the second and now the shooting of half a dozen a year is all that is necessary." The cat problem Mr. Baynes recognizes as a most serious one. He says "no sensible person would advocate the extermination of cats, but I do believe that a serious effort should be made to get rid of unnecessary ones" . . . and people should "take care of such cats as they consider worth keeping. . . . It is unneighborly to kill one's neighbor's cat, but just as unneighborly to permit a cat to kill one's neighbor's birds."

Mr. Baynes' wonderful success with bird clubs at Meridan, N. H., and elsewhere in New England is well known and here he offers helpful suggestions for others who would follow his method.

Mr. Baynes gives the scientific ornithologist full credit for his large share in the work of bird preservation, an acknowledgment too often ignored in these days of "conservationists." He argues that the sientific collector should be allowed to go about his work unhampered by petty

restrictions and says that the complaint against the scientific man "is usually the cry of some conservationist who wishes he were scientific but is not." He adds "one of the strongest arguments in favor of preserving birds, is that they have great economic value; the facts which support this argument have been ascertained, not by the men who shout them from the housetops but by quiet, modest ornithologists who sit in their laboratories and whose names are seldom seen in the newspapers. Other men 'on the firing line,' do wonderfully effective work but sometimes they do not seem to realize that this work is made possible, not so much by the noise of their own big guns, as by the ammunition supplied to them by the scientific men who work without making any noise at all."

All in all this book of Mr. Baynes' is just what hundreds of people are looking for, in every part of the country, to help them in establishing closer relations with their wild bird neighbors. The illustrations are very attractive and the text well gotten up.—W. S.

Job on Wild Fowl Propagation.¹—Like Mr. Baynes, Mr. Job has developed a branch of wild bird preservation which is peculiarly his own—that of the propagation of wild species. The need of Quail and Ruffed Grouse for stocking purposes has long been recognized and for some years past their artificial propagation has been successfully carried on in various places. In the case of wild ducks however the possibilities are only just beginning to be appreciated and undoubtedly their is a great future for the development of this work. In the two bulletins before us Mr. Job describes his experience and that of others, presenting in detail such information on the various phases of the problem as prospective breeders will require. Speaking of the breeding of ducks he says "It is coming to be a source not only of pleasure but of great practical good, to breed wild water-fowl by such methods as I have described. Every state should propagate and liberate wild ducks of such species as it is found are likely to breed in its domain, since it is proved that young wild ducks are strongly inclined to breed near where they were reared." The Wood Duck which a decade ago was called a "vanishing game-bird" is now being reared by thousands and the species is being reestablished and made abundant. Many owners of large estates, we are told, are already interesting themselves in propagating wild ducks on native swamp lands, and in this way it seems quite possible to offset the reduction in the numbers of many species, caused by the draining and cultivation of their former nesting grounds in the Dakotas, Manitoba, Saskatchewan, etc. Mr. Job's timely 'bulletins' will meet the needs of a constantly increasing number of wild-fowl breeders.

—W. S.

¹ Propagation of Upland Game-Birds. By Herbert K. Job. Bulletin No. 2. Nat. Asso. Audubon Soc., 1974 Broadway, N. Y. City, April, 1915. Price 25 cents. (pp. 33-72).

Propagation of Wild Water-Fowl. By Herbert K. Job. Bulletin No. 3. Nat. Asso. Audubon Soc., 1974 Broadway, N. Y. City, May, 1915. Price 25 cents. (pp. 73-104).

Laing's 'Out with the Birds.'¹—Mr. Laing seems not only to know his birds but to know how to tell us about them, and as we turn the pages of his book we share with him the enthusiasm of the nature lover and the excitement of the bird photographer. The unique feature of 'Out with the Birds' is that it treats of a region not generally touched upon by nature writers—Manitoba, and naturally the birds that occupy the attention of the bird student are not those which usually figure in our outdoor bird books. When spring awakens, it is not to the accompaniment of Bluebird warble, but the honking of Geese on the prairie and the "tinkling, fairy melody" of the Lapland Longspur chorus on the eve of departure for farther north. The morning awakening begins with the booming of the Sharp-tailed Grouse, the lisping song of the Prairie Horned Lark, high in the air, and the clamor of the ducks in the marshes.

The mating antics of the Grouse are fully described and we learn of the habits of various ducks, happily free from the usual accompaniment of shotgun and hunters' anecdotes. We learn too of the life of the White-rumped Shrike, Franklin's Gull, Black Tern and Snow Goose. Mr. Laing's syllabic representations of the songs of certain familiar species are original and quite as effective as the more familiar ones. For example the Towhee's song as he hears it is "Sweet, bird sin-n-n-ng" and the White-throated Sparrow far away from the New England home of "Old Sam Peabody" says "Oh, dear Canada! Canada! Canada!"

The illustrations, while they do not average up to the best that our bird photographers of today produce are attractive and add much to the interest of the book. One serious defect is the lack of an index which makes it difficult for the bird student to pick out from the text the information on any given species.—W. S.

Cooke on Bird Migration.²—This little pamphlet is, so far as its object and scope are concerned, a new edition of a similar one published some twelve years³ ago, but it is much fuller and replete with additional information. It covers the subject quite fully under the headings Causes of Migration, Relation of Migration to Weather, Day and Night Migrants, Distance of Migration, Routes of Migration, Direct and Circuitous Migration Routes, Eccentric Migration Routes, Wide and Narrow Migration Routes, Slow and Rapid Migration, How Birds find their Way, Migration and Molting Casualties during Migration, Are Birds exhausted by Long Flight? Evolution of Migration Routes, Normal and Abnormal Migration, Relative

¹ *Out With the Birds.* By Hamilton M. Laing. Illustrated with Photographs. New York. Outing Publishing Company, MCMXIII. 8vo. pp. 1-249. \$1.50, postage 12 cts. extra.

² *Bird Migration.* By Wells W. Cooke. U. S. Dept. of Agriculture. Bulletin No. 185. April 17, 1915. pp. 1-47.

³ *Some New Facts about the Migration of Birds.* Yearbook U. S. Dept. Agr. for 1903.

Position during Migration, Relation between Migration and Temperature, Variations in Speed of Migration, The Unknown. The pamphlet is clearly written and places the subject before the public in such a way as to make fascinating reading while it will undoubtedly interest a large number of people in the study and recording of bird migration and so ultimately serve to increase the data bearing on the subject. To the scientific man this up to date treatment of one of the most interesting phenomena of bird life will also prove of great interest, but he will look in vain for any reference to other papers on the subject by the author or anyone else, where he can follow up the matter and compare the various opinions and theories that have been advanced. Such references may not be required in Farmer's Bulletins or similar publications of the Department of Agriculture, but in one of this sort, which appeals to scientists as well as laymen, it seems that the universal custom in scientific publications should have been adhered to and the value of the pamphlet thereby measurably increased.

While not for a moment questioning the accuracy of Prof. Cooke's results in his studies of bird migration it seems pertinent in this connection to call attention to an unfortunate tendency in most publications on this subject in America, *i. e.* that of publishing ultimate results or theories without presenting the detailed data upon which they are based. It may be claimed that European publications on the subject represent a maximum of detailed data and a minimum of conclusions, and this may be true, but even so it is decidedly more in accord with the methods employed in other lines of scientific work.

In describing a new species or working out the geographic range of a group of subspecies, pages are often devoted to the citation of detailed data, where the results of the study is summed up in a few words. The same method could be employed with advantage in works on bird migration, but too often we do not even know upon whose observations results are based, or how many records or observers contributed to them. Furthermore migration tables or comparisons are not definite facts but are averages and computations often involving the rejection of some of the material, and the personal equation enters into this work to such an extent that it seems absolutely essential that the most important details involved in obtaining results should be presented. For instance, to take an example from Prof. Cooke's paper, the isochronal migration line of April 20 for the Black and White Warbler passes through Philadelphia, yet in 'Cassinia,' 1912, p. 9, Prof. Cooke gives April 17 as the average time of first arrival for Philadelphia while in 'Bird Lore,' 1905, p. 203, April 27 is given (Germantown = Philadelphia). So also in 'Bird Lore,' 1905, p. 205, we find May 14 given as the average date of arrival of the Black-poll Warbler for Englewood, N. J., but the isochronal line for May 15 runs far north of this locality. Evidently these lines are not based upon all the data at hand, some have been accepted and others rejected, on good grounds no doubt, but the student who would judge of

this matter is blocked at once by the absence of data or explanation. When we realize that nearly all computations as to the speed and direction of migration depend upon the accuracy of these isochronal lines it is obvious that other students of bird migration will naturally demand the same presentation of detailed data that is customary in other fields of scientific research.—W. S.

Faxon on 'Relics of Peale's Museum.'¹—Dr. Faxon has done a commendable piece of work in publishing an annotated catalogue of the types of Wilson, Bonaparte and Ord formerly in the Philadelphia (= Peale's) Museum and now in the Museum of Comparative Zoölogy at Cambridge. The history of the collection which precedes the catalogue is very interesting reading, and when we consider the vicissitudes through which it passed we are inclined to marvel that any of the specimens were fortunate enough to survive!

We entirely agree with Dr. Faxon that the known history of the specimens and the careful comparisons that he has made with figures and descriptions clearly establish them as the types, even though the original labels were lost.

Fifty-three of these ancient types are now safely preserved and catalogued in the Museum of Comparative Zoölogy and together with the type of the Cape May Warbler in Vassar College, and those of the Mississippi Kite and Broad-winged Hawk in the Philadelphia Academy, they probably comprise all that are extant of the originals upon which the descriptions of Wilson, Ord and Bonaparte in the 'American Ornithology' and its continuation were based.—W. S.

Mathews' 'Birds of Australia.'²—Mr. Mathews' great work continues to appear regularly and maintains its high standard of excellence. The publishers announce that with the completion of Vol. IV, the subscription list will be absolutely closed. No more than 260 copies will be issued and "should not all of these be taken up the surplus will be destroyed."

The two parts now before us complete the Anseriformes and Pelecaniformes. The discussion of nomenclature is very full and the classification and generic subdivisions of the latter group are gone into in great detail. Many pages are devoted to replies to criticisms as to the treatment of certain groups and recognition of certain subspecies and genera, while the 'British Museum Catalogue,' 'B. O. U. List' and 'A. O. U. Check-List' as well as several individual authors come in for some sharp criticism. In all cases of nomenclatural discussion however, Mr. Mathews seems very fair, abiding rigidly by the International Code, without any quibbling over individual cases.

¹ Relics of Peale's Museum. By Walter Faxon. Bull. Mus. Comp. Zoöl. LIX, No. 3. pp. 119-148. July, 1915.

² The Birds of Australia. Vol. IV. Part 2, February 17, 1915. Part 3, June 23, 1915.

The question of recognition of genera and subspecies is of course a matter of personal opinion, though he brings out some important and original facts in treating of the Gannets and Frigate Bird.

In consideration of the general accuracy of minute details we might call attention to the apparent omission of a synonym under *Mesocarbo ater ater*. We are informed in the last paragraph that the bird figured is the type of *M. a. territori* but this name occurs nowhere else in the article. So also with *Hypoleucus varius whytei* under *H. v. perthi*.

We note as new forms only the following *Phalacrocorax carbo indicus* (p. 171) India; *Scaophaethon rubricauda rothschildi* (p. 303) Laysan, Niihau; *S. r. brevirostris* (p. 303) Bonin Isls. Most of the new names required in the treatment of the Pelecaniformes have been previously published in the 'Austral Avian Record'.—W. S.

Recent Monographs by Oberholser.¹—Mr. Oberholser has recently published the results of three careful systematic studies of the American Spotted Owl; the Ruddy Kingfisher; and Long-tailed Goatsucker of the far East.

He finds that the four recognized races of the Spotted Owl resolve themselves into two valid forms. *Strix o. occidentalis* of the Pacific Coast region of which *S. o. caurina* is a synonym and *S. o. lucida* ranging from Colorado and western Texas to northern Mexico, of which *S. o. huachucæ* is a synonym. The presence of a dark and light phase of plumage in this species is responsible in part for the description of so many supposed races.

Of the Kingfisher *Entomothera coromanda* nine races are recognized of which five are new. *E. c. mizorhina* (p. 645) N. Andaman Isl.; *E. c. neophora* (p. 646), Tapanuli Bay, Sumatra; *E. c. pagana* (p. 648), N. Pagi Isl., Sumatra; *E. c. ochrothorectis* (p. 652), Masbate Isl., Philippines, and *E. c. bangsi* (p. 654) Ishigaki Isl., Riu Kiu Isls.

The goatsucker, *Caprimulgus macrurus*, is also divisible into nine races, *C. m. mesophanis* (p. 590), Ambrina Isl. and *C. m. anamesus* (p. 593), Singapore Isl., being new. These papers straighten out three difficult groups of birds very satisfactorily.—W. S.

Nature and Science on the Pacific Coast.²—This little volume is

¹ Critical Notes on the Subspecies of the Spotted Owl, *Strix occidentalis* (Xanthus). By Harry C. Oberholser. Proc. U. S. Nat. Mus. 49, pp. 251-257. July 26, 1915.

A Review of the Subspecies of the Ruddy Kingfisher, *Entomothera coromanda* (Linneus). By Harry C. Oberholser. Proc. U. S. Nat. Mus. 48, pp. 639-657. May 18, 1915.

A Synopsis of the Races of the Long-tailed Goatsucker, *Caprimulgus macrurus* Horsfield. Proc. U. S. Nat. Mus., 48, pp. 587-599. May 3, 1915.

² Nature and Science on the Pacific Coast. A Guide-book for Scientific Travelers in the West. Edited under the Auspices of the Pacific Coast Committee of the American Association for the Advancement of Science. Illustrated with Nineteen text figures, twenty-nine half-tone plates and fourteen maps. Paul Elder and Company, Publishers. San Francisco. 12 mo., pp. 1-294.

admirably adapted to its purpose — that of furnishing in concise form such information as the numerous visitors to the coast during the Panama Pacific Exposition, who are interested in nature, will be likely to desire. The work will however have a permanent value to the numerous tourists who are constantly visiting California, and as a general work of reference.

The several chapters are written by specialists on the subjects of which they treat and are accompanied by illustrations and by a brief bibliography from which books treating the matter in further detail may be selected.

Dr. Joseph Grinnell not only edits the volume for the Committee but also treats of 'The Vertebrate Fauna of the Pacific Coast' exclusive of the fishes, and in a few pages gives one a good idea of the diversity of forms represented, and their distribution in the several life zones and faunal areas. There are thirty other chapters on various topics, zoological, botanical, geological, mineralogical, etc. Dr. Grinnell's contribution has also been issued as a separate.—W. S.

Murphy on 'The Penguins of South Georgia.'¹ — Several papers dealing with the results of Mr. Murphy's expedition to South Georgia have appeared in 'The Auk' and elsewhere and a number of scientific societies have been made familiar with the avifauna of the island through his lectures and admirable lantern slides. In the present paper the photographs from which many of the lantern slides were made appear as half-tone plates, while the text places on permanent record his observations on the life history of the penguins which constitute the main population of South Georgia.

The two species which are still plentiful are the "Johnny" Penguin (*Pygoscelis papua*) and the King Penguin (*Aptenodytes patagonica*), and only one other was observed by Mr. Murphy, the Ringed Penguin (*Pygoscelis antarctica*) and of it only three individuals. Later information however showed also the presence of the Macaroni Penguin (*Eudyptes chrysophrys*).

Mr. Murphy presents a very interesting account of the habits, molt, coloration, etc., of the two species which he was able to study and compares his experience with that of others.

The "Johnny" Penguin he states "has not in any degree the fearless and courageous disposition of its Antarctic congener *Pygoscelis adeliae*," and he shows further that it lacks the jumping and diving ability of that species. This he attributes to the fact that it has "a Subantarctic range and breeds on no land which has an ice-shelved coast." So that the need for such phenomenal jumping power disappears.

Mr. Murphy emphasizes the current misstatements regarding penguins. Taking for example such a work as the 'Cambridge Natural History'

¹ The Penguins of South Georgia. By Robert Cushman Murphy. Science Bull. Mus. Brooklyn Inst. Arts. and Sci., Vol. 2, No. 5, pp. 103-133. August 2, 1915.

we find it stated that (1) the flippers have highly compressed bones with no power of flexure; (2) the tongue is rudimentary; (3) they lay two coarse flavored eggs (4) the young are hatched blind; (5) the parent feeds the young by inserting its bill into that of the nestling. All of these statements Mr. Murphy found to be erroneous: the tongue is in most if not all species well developed; the eggs are from one to three in different species; the eyes of the young are open at hatching and the young inserts its bill into that of the parent when feeding not *vice versa*.

Mr. Murphy has made an important contribution to our knowledge of the Spheniscidae which may take its place along with Levick's 'Antarctic Penguins' and other recent publications on the subject. His photographs are excellent but the printing of some of the half tones has been very poorly done.—W. S.

Chapman on New Birds from Central and South America.¹—Dr. Chapman in continuing his studies of the extensive Colombian collections obtained by himself and his collectors, finds additional new forms both in Colombia and in neighboring countries, which he proceeds to name in the present paper. *Odontophorus guianensis panamensis* (p. 363) is described from Panama and the relationship of the other subspecies discussed. The races of *Leptotila rufaxilla* are considered, of which two are described as new, *L. r. hellmayri* (p. 368), Trinidad; and *L. r. pallidipectus* (p. 369) Buena Vista, Colombia. A partial revision of the South American Sparrow Hawks results in the recognition of seven races of which *Certhieis sparverius caucæ* (p. 375) Cauca Valley, Colombia, and *C. s. fernandensis* (p. 379) Island of Juan Fernandez, off Chile; are new.

The following additional new forms are proposed: *Asio flammeus bogotensis* (p. 370), Bogota; *Rhynchoryx cinctus australis* (p. 365), Barba-coas, Col.; *Columba subvinacea peninsularis* (p. 366), Cristobal Colon, Ven.; *Chamepelia rufipennis caucæ* (p. 367), Cauca Valley; *Pyrrhura melanura pacifica* (p. 382), Buenavista Nariño, Col.; *Psittacula conspicillata caucæ* (p. 383), Cauca Valley, *Curucujus massena australis* (p. 384), Barba-coas, Col.; *Andigena nigrirostris occidentalis* (p. 385), San Antonio above Cali, Col.; *Chlororhynchus rubiginosus buenaristæ* (p. 386), Buena Vista, Col.; *Atlapetes gutturalis brunnescens* (p. 387), Boquete, Chiriqui.—W. S.

Cory on New South American Birds.²—Mr. Cory's continued study of the South American collections received at the Field Museum results in the description of the following new forms: *Threnetes leucurus rufigastra*

¹ Descriptions of Proposed New Birds from Central and South America. By Frank M. Chapman. Bull. Amer. Mus. Nat. Hist., XXXIV, pp. 363-388. May 27, 1915.

² Notes on South American Birds, with Descriptions of New Subspecies. By Charles B. Cory. Field Museum of Natural History Publication 183. Ornithological Series, I, No. 9, pp. 303-335. August 7, 1915.

(p. 303), Moyobamba, Peru; *Leucipps fallax richmondi* (p. 303), Margarita Isl.; *Piaya cayana ceara* (p. 304) Ceara, Brazil; *P. melanogaster ochracea* (p. 304) Yurimaguas, Peru; *Chrysotilus punctigula zuliae* (p. 305), Zulia, W. Peru; *Veniliornis tenuirostris ceara* (p. 306), Ceara, Brazil; *Scapaneus melanoleucus ceara* (p. 306), Ceara, Brazil; and *S. pallens peruviana* (p. 307), Molinopampa, Peru. Following these is a 'Key to the South American Species and Subspecies Belonging to the Genus Piaya.' This does not seem to be a very happy treatment of the subject, in-as-much-as the statements of several authors are ignored without explanation and several subspecies are omitted without any mention whatever. Thus *P. c. cabanisi* Allen is ignored although Hellmayr states that it is a valid race (Nov. Zool. XVII, No. 3, p. 401) while we find no reference to *P. c. boliviensis* Stone. We moreover look in vain for remarks "antea" referred to at bottom of p. 310. Mr. Cory's paper concludes with a 'Revision of the Sparrow Hawks of South America and Adjacent Islands,' which includes diagnoses of three new forms, *Certhneis sparveria andina* (p. 323), Quito, Ecuador; *C. s. intermedia* (p. 325), Villavicencio, Colombia; and *C. s. perplexa* (p. 327), Lower Essequibo River, British Guiana, making fourteen in all which are recognized by the author.—W. S.

Burns on Periods of Incubation.¹—Mr. Burns has done a good work in compiling a list setting forth the time of incubation for some 225 species and races of North American birds. Comparatively few careful studies of this subject have been made, most oölogists being more anxious to secure the egg shells intact than to ascertain how many days will elapse before the young break out of them. The figures given are therefore often estimates or guesses rather than the result of actual observation, and something authoritative has been a great desideratum. The only weak point in Mr. Burns' paper is that he does not quote his authority for the individual figures, and the list of authors and correspondents from whose statements the list is compiled, must necessarily represent a considerable range of accuracy. Even if the figures for which he could personally vouch were so marked it would have added a large measure of strength to his paper, as his care and accuracy are well known. The use of the query as denoting "possible inaccuracy" is not clear, as we note in the case of the Sparrow Hawk the period of incubation is given as "29-30(?) days" whereas in 'The Auk' for July, 1913, Miss Althea R. Sherman, in a most careful study of this species, ascertained the period from deposition to hatching in four eggs of this species to be from earliest to latest 35, 31, 30 and 29 days respectively. At all events Mr. Burns's list is an excellent foundation upon which to build. Let there be more energy devoted to this phase of the subject and less to the amassing of egg shells, and let observers check up their results with Mr. Burns' list.—W. S.

¹ Comparative Periods of Deposition and Incubation of Some North American Birds. By Frank L. Burns. Wilson Bulletin, No. 90. March, 1915. pp. 275-286.

Henshaw on American Game Birds.¹—This paper follows exactly the plan of two earlier publications on 'Common Birds of Town and Country' which appeared previously in the 'National Geographic Magazine,' the one having been originally issued as a bulletin of the U. S. Department of Agriculture. There are 72 colored illustrations from original paintings by Louis Agassiz Fuertes. Of these 16 represent gallinaceous birds, 28 geese and ducks, 17 waders, 3 pigeons and doves and 8 cranes and rails, but as several species often appear together the total number treated is nearly 100. The text presents the range of each species and a brief account of its habits. Only those familiar with the cost of producing the high grade of colored illustrations here presented will appreciate the expense to which the 'National Geographic Magazine' has gone in producing this series of portraits of North American birds; while the educational value of the undertaking, in bringing this mass of ornithological information to thousands of homes that would not otherwise obtain it, is impossible to estimate.—W. S.

Taverner on The Double-crested Cormorant and Its Relation to the Salmon Industry.²—In this pamphlet Mr. Taverner presents the results of an investigation of the food of the Cormorants at Percé Village and Gaspe basin, Quebec, undertaken during the summer of 1914. Incidentally much interesting information on the nesting of the birds is presented, while the food habits are treated at considerable length. It was found that, during the period of observation at least, the Cormorants feed on other species of fish and do not molest the Salmon, while evidence collected inclined the writer to regard them as entirely blameless of this charge. They do however inconvenience the fisherman, when herring are scarce, by stealing the few which they catch for bait. The fishing clubs of the vicinity we learn offer bounties of 25 cents per head for Cormorants, Sheldrakes, Kingfishers and Divers and \$2. for a Kingfisher's nest with the female bird! Mr. Taverner's paper is an interesting and valuable contribution.—W. S.

Shufeldt on the Osteology of the Limpkin and Stone Plover.³—In two detailed and fully illustrated papers Dr. Shufeldt describes the skeletons of these two birds and compares them with those of related groups. The Limpkin he regards as affiliated more closely with the Rails

¹ American Game Birds. By Henry W. Henshaw. National Geographic Magazine XXVIII, No. 2. August, 1915. pp. 105-158.

² The Double-crested Cormorant (*Phalacrocorax auritus*) and its Relation to the Salmon Industries on the Gulf of St. Lawrence. By P. A. Taverner. Canada Dept. of Mines. Museum Bulletin, No. 13. April 30, 1915. pp. 1-24.

³ On the Comparative Osteology of the Limpkin (*Aramus vociferus*) and its Place in the System. By R. W. Shufeldt. Anatomical Record, Vol. 9, No. 8. August, 1915. pp. 591-606.

On the Comparative Osteology of *Orthorhamphus magnirostris* (the Long-billed Stone Plover). By Dr. R. W. Shufeldt. Emu, XV, Part 1, July 1, 1915. pp. 1-25.

than with the Cranes, although it represents a family distinct from the Rallidæ. This conclusion illustrates how difficult it is to arrive at any generally acceptable classification of birds, so great do the opinions of individuals differ. Dr. P. Chalmers Mitchell in a recent investigation of this same problem on the basis of osteology comes to a diametrically opposite opinion! (Abst. Proc. Zool. Soc. London, May 25, 1915). The Stone Plover Dr. Shufeldt finds to be probably not closely allied to the Bustards as has sometimes been claimed. On the other hand it shows clearly the relationship between the *Limicola* and the *Longipennis*, and "so far as osteology goes, beautifully bridges across one of the gaps, for we find both pluvialine and larine characters intimately blended all through the skeleton." Dr. Mitchell's views upon this point would be interesting for comparison.—W. S.

Recent Publications of the Biological Survey.—Prof. Cooke¹ in a report on the shorebirds points out their value as game and the importance of preserving them from extinction. The Wilson's Snipe, Woodcock, Upland Plover and Eskimo Curlew are the species especially considered and their former abundance and rapid decrease in numbers are reviewed and the causes pointed out. As an illustration of the unchecked slaughter of these birds in the southern States the record of a gunner in Louisiana is cited, who in 20 years from 1867 to 1887 killed 69,087 Wilson's Snipe!

Mr. Alex. Wetmore² has been making a field study of the mortality of ducks, shorebirds, herons, etc., in the neighborhood of Great Salt Lake where large numbers of these birds have died under apparently similar conditions to those which attended like mortality at Tulare and Owens Lakes, California.

The cause of the trouble has not been positively determined but seems in all probability to be alkaline poisoning from the water. The increase in irrigation it is suggested has taken up vast quantities of alkali from the soil and in dry seasons the water naturally becomes heavily charged with it. Investigations by experts fail to show that bacteria, nematodes or poison from smelting works have had serious effect upon the birds.

Another valuable paper recently issued is a new edition of Mr. McAtee's 'Important Wild-Duck Foods,'³ which is in great demand among breeders of wild fowl.—W. S.

Da Costa on the Economic Value of the Birds of São Paulo, Brazil.⁴

¹ Our Shorebirds and their Future. By Wells W. Cooke. Yearbook U. S. Department of Agriculture for 1914, pp. 275-294.

² Mortality Among Waterfowl around Great Salt Lake, Utah. (Preliminary Report.) By Alex Wetmore. Bull. 217 U. S. Department of Agriculture. May 26, 1915.

³ Eleven Important Wild-Duck Foods. By W. L. McAtee. Bull. 205 U. S. Department of Agriculture, May 20, 1915.

⁴ Os Pequenos Amigos da Agricultura. Por. J. Wilson Da Costa. Published with the aid of the Secretary of Agriculture of São Paulo, 1914, pp. 1-118, illustrated.

As a pioneer publication on economic ornithology for Brazil, this brochure is worthy of attention by those interested in the value of birds in their relation to agriculture. Chapters are devoted to the dangers attendant on extensive deforestation, the function of certain useful birds and animals, the breeding of wild forms in captivity, birds that are useful, animals friendly to agriculture, the usefulness of hummingbirds and bees, predacious insects, and the economic services of domesticated birds.

Grave dangers are foreseen in the extensive destruction of forests in many areas, not only to the native fauna but to climatic conditions in general. After a few notes on the value of certain mammals the author takes up the question of the birds useful to agriculture, sketching briefly the services of the various orders and families and giving an account of a few common species in each group. Attracting birds about fields and houses is recommended by the placing of pans of water and boxes containing grain and seeds.

The Black Vulture is said to do harm in carrying germs of various epizootics, on the authority of Dr. H. von Ihering. The other two vultures found (*Cathartes aura* and *C. urubitinga*) are apparently not included in this statement. They have been seen destroying snakes. More than sixty species of woodpeckers are found in Brazil. The author remarks that they constitute a "comissão sanitaria phitophathologica" for the forest trees. Attention is drawn to the destruction of injurious ants by *Colaptes campestris*. The Anis are said to destroy many cattle ticks (a belief not yet substantiated in stomach examinations in the Biological Survey). They feed on other insects and lizards as well. The Guira Cuckoo (known locally as *Almo de gato*) also lives on insects. The illustrations are in the main from photographs of mounted birds. The drawing (p. 35) labelled Ani is apparently some species of *Molothrus*.

In an appendix (pp. 106-118) is a short account of the wild pigeons of Brazil. It includes a discussion of their habits, nidification, food and range.

Though we may hesitate in endorsing fully some of the statements made in regard to the food of certain species, the author is to be commended for his efforts in behalf of the birds native to his country. Our knowledge of economic conditions in regard to Tropical American species is slight and it is hoped that the present contribution is the forerunner of more detailed investigations — A. W.

Third Report on Food of Birds in Scotland.—The report upon investigations of the food of birds in Scotland in 1913-1914, by Miss Laura Florence, has been published.¹ It catalogs the stomach contents of 891 birds, the total number now examined being 2897. As usual the report is made up of detailed analyses of individual stomachs, with brief summaries for each species. No general conclusions are drawn. Miss Florence is now at Stanford University preparing herself for a career in Economic

¹ Trans. Highland and Agr. Soc. Scotland. Fifth series, Vol. 27, 1915, pp. 1-53.

Entomology. It will be an occasion for congratulation to have an experienced bird student added to the ranks of entomologists.—W. L. M.

Economic Ornithology in Recent Entomological Publications.—Katydidds are said to have caused the loss of as much as a fourth of the crop in certain orange groves of California in 1914. The entomologists who describe the depredations — Messrs. J. R. Horton and C. E. Pemberton — state that "birds undoubtedly play an important part in reducing the number of adults each year."¹ "In 1911," they also say "a small chipping sparrow was noted in some abundance among trees of various Katydid-infested orchards, and was apparently very busily capturing Katydidds. Birds are undoubtedly the most important enemies of the Katydid in this section" (p. 11).

On the other side of the ledger must be set down the activities of bird enemies of *Calosoma sycophanta* a predacious beetle, introduced into New England on account of its value as a destroyer of the gipsy-moth. Messrs. A. F. Burgess and C. W. Collins in their report on this beetle say: "It is undoubtedly true that this species is eaten to some extent by birds, and the hairy woodpecker has been charged with destroying it on several occasions. The crow has been observed to feed on the beetles and also to carry them to their nests which were occupied by young birds."²

The authors, however, report a satisfactory increase and spread of the beetle.

The widespread outbreak of the army-worm, in 1914, called forth the publication of a number of bulletins, most of which acknowledge the value of birds as enemies of this pest. We quote from two of these reports. Dr. W. E. Britton, State Entomologist of Connecticut, states that "Of the birds occurring in Connecticut, the most important destroyers of the army-worm are the blackbirds, starlings, robins, thrushes, bobolinks, catbirds, and barn swallows. Even the much despised English sparrow has been observed to feed upon them."³

With relation to an invasion of army-worms in Canada, Mr. Arthur Gibson says:⁴ "The wild birds are an important aid in outbreaks of noctuid caterpillars, and in 1914 large numbers of army-worms were devoured by them. Blackbirds were frequently noticed feeding upon the caterpillars in Ontario, and also in New Brunswick, as were also crows. During a local outbreak of the army-worm near Treesbank, Man., in 1913, Mr. Norman Criddle, Field Officer of the Branch, observed, in August, thousands of crows feeding upon the larvae. They were also seen to dig out and eat the pupae. A large flock of probably three thousand birds visited the infested locality every day from the time Mr. Criddle first noticed the worms until at least two weeks after the larvae had pupated. In western

¹ Bull. 256, U. S. Dept. Agr., July 27, 1915, p. 13.

² Bull. 251, U. S. Dept. Agr., July 27, 1915, p. 18.

³ Ann. Rep. Conn. Agr. Exp. Sta. for 1914, Part III, p. 166, 1915.

⁴ Bull. 9, Ent. Branch, Dept. Agr., Dominion of Canada, 1915, pp. 16-17.

Ontario, the English sparrow was reported to have fed freely upon the worms during the past season, and in Nova Scotia the writer saw the Vesper Sparrow devouring the caterpillars. Other wild birds which previously have been seen to feed upon the army-worm are the Bobolink, Robin, Meadow-lark, Bluebird, Kingbird, Blue-jay, Flicker, Cat-bird, Phoebe, Cowbird, Baltimore Oriole, Chipping sparrow, Chickadee, and Quail. The Sharp-tailed Grouse, common in Manitoba, feeds on smooth caterpillars, and doubtless would devour the army-worm. The same statement undoubtedly holds good for other birds than the above mentioned, which find their food in the open. The value of protecting our native insectivorous birds will thus be readily seen, and farmers, gardeners, etc., should do all they possibly can to protect them from being shot and their nests from being robbed." — W. L. M.

The Ornithological Journals.¹

Bird-Lore. XVII, No. 3. May-June, 1915.

Bird Photography for Women. By Miss E. L. Turner.—With numerous photographs of British birds.

Bird-Life in Southern Illinois. IV. Changes Which Have Taken Place in Half a Century. By Robert Ridgway.—An admirable discussion of decrease in birds in general and of this region in particular.

Migration of North American Birds. By W. W. Cooke.—Brown Creeper and Gnatcatchers. Plumage notes by F. M. Chapman, colored plate by Fuertes.

Bird-Friends in Arizona. By W. L. and Irene Finley.—Contains a splendid series of photographs of desert birds followed by a similar article in the July-August issue.

Bird-Lore. XVII, No. 4. July-August, 1915.

The Making of Birdcraft Sanctuary. By Mabel Osgood Wright.

Louis Agassiz Fuertes.—Painter of Bird Portraits. By F. M. Chapman (from the American Museum Journal).

Our Tree Swallows. By M. Louise Brown.

How the Sapsucker rears its Young. By C. W. Loveland.

The Kingbird—Educational Leaflet by T. G. Pearson, with colored plate by Horsfall.

The Condor. XVII, No. 3. May-June, 1915.

A Summer at Flathead Lake, Montana. By Aretas A. Saunders.

An Apparent Hybrid between Species of the Genera *Spatula* and *Querquedula*. By H. S. Swarth.—A male shot at Del Rey, Cal., Dec. 13, 1914.

An Annotated List of the Birds of Kootenai County, Idaho. By H. J. Rust.—149 species listed.

¹ The name of the editor and publisher of each journal will be found in the January number of 'The Auk.'

The Condor. XVII, No. 4. July-August, 1915.

Nesting of the Bohemian Waxwing in Northern British Columbia. By Ernest M. Anderson.

Notes on Some Birds of Spring Canyon, Colorado. By W. L. Burnett.

Woodpeckers of the Arizona Lowlands. By M. French Gilman.—A particularly interesting and well illustrated paper.

Further Notes from the San Bernardino Mountains. By A. van Rossem and W. M. Pierce.—Notes on 34 species.

The Wilson Bulletin. XXVII, No. 2. June, 1915.

Notes on the Red-winged Blackbird. By Ira N. Gabrielson.

Notes from the Laurentian Hills [Quebec]. By L. McI. Terrill.—Nesting of Yellow-bellied Flycatcher, Golden-crowned Kinglet and Blackburnian Warbler.

Corrections and Additions to the Preliminary List of the Birds of Essex County, N. J. By L. S. Kohler.

A List of the Birds of Clay County, South Dakota. By S. S. Visher.

The Oölogist. XXXII, No. 5. May 15, 1915.

The Nesting of the Western Goshawk. By E. R. Forrest.

The Oölogist. XXXII, No. 6. June 15, 1915.

Farralone Rail. By E. E. Sechrist.—Nesting near San Diego, Cal.

The Elusive Kentucky Warbler. By A. J. Kirn.—Nesting in Oklahoma.

The Oölogist. XXXII, No. 7. July 15, 1915.

The Northern Raven [breeding in Pennsylvania]. By S. S. Dickey.

As a supplement to this issue is published "A Bibliography of Scarce or Out of Print North American Amateur and Trade Periodicals Devoted More or Less to Ornithology." By Frank L. Burns. This is a valuable compilation of 147 titles, and is more than a mere bibliography of the journals since the more important articles in many of them are cited.

The list is of course not exhaustive, although probably all the journals of any value are included. It would however have added to its value if the author had stated whether the journals mentioned were only such as he had personally handled and verified, or all of which he was able to secure information. Mention might be made here of a similar catalogue published by Wm. J. Fox, assistant librarian of the Academy of Natural Sciences of Philadelphia, in the Bulletin of Bibliography, April, 1908.

The Oölogist. XXXII, No. 8. August 15, 1915.

Nesting of the Yellow Rail in North Dakota. By F. Maltby.

Nesting of the Greater Yellowlegs in Manitoba. By F. S. Norman.

A Systematic Study of the Diving Process of *Erismatura jamaicensis*. By A. Cookman.

Proceedings of the Nebraska Ornithologists' Union. Vol. VI, Part 3. July 10, 1915.—Contains reports of the sixteenth Annual Meeting and on Bird Migration at Lincoln, Neb., spring, 1913.

The Ibis. X Series. Vol. III, No. 2. April, 1915.

Notes on the Ornithology of the Matopo District, Southern Rhodesia.

By L. Beresford Mouritz.—An annotated list of 237 species, completed in the July number.

Notes on the Ornithology of Cyprus. By F. R. S. Baxendale.—Thirty-eight species considered.

Report on the Birds collected by the late Mr. Boyd Alexander during his last Expedition to Africa. Part III. The Bird of Annobon Island. By D. A. Bannerman.—17 species.

On a Collection of Birds from British East Africa and Uganda, presented to the British Museum by Capt. G. B. Cossens.—Part II. Accipitrimorphes—Cypseli. By C. H. B. Grant. With Field Notes by the Collector W. P. Lowe.—This installment brings the list of species up to 170. Under a number of species all of the subspecies are considered and many questions of synonymy worked out. *Irrisor erythrorhynchos ruwenzorae* (p. 286) from Ruwenzori is described as new. In the July number the groups Collii-Pici are considered and the list carried to 212. The same careful study of allied races marks this part also.

The "Mauritius Hen" of Peter Mundy. By W. L. Slater.—Interesting comments on the references to the Dodo and "Mauritius Hen" (*Aphanapteryx brækii*) an extinct Rail, in the recently published 'Travels' of Peter Mundy.

Coloration as a Factor on Family and Generic Differences. By Percy R. Lowe.—This is the full text of Mr. Lowe's address before the British Ornithologists' Club already noticed.

Mixed Bird-parties. By C. F. M. Swynnerton.—An interesting description of such assemblages in various parts of the world, which are explained on the basis of systematic coöperative hunting.

A Note on *Loxia pytyopsittacus* Bork. By C. B. Ticehurst.—Plea for its recognition as a valid form.

The New B. O. U. List of British Birds. By Dr. E. Hartert.—A valuable review by the principal author of the British 'Hand-list' which emphasizes the opinion expressed in these columns that differences in bird names today are dependent mainly on questions of ornithology rather than of nomenclature. Several corrections to the 'List' are also given in the Correspondence columns.

The Ibis. X Series. Vol. III, No. 3. July, 1915.

Notes on Bird-Migration at the Mouth of the Yenesei River, Siberia, as observed in the autumn of 1914. By Maud D. Haviland.—An important paper, among other statements the author says "any acceleration or delay in the annual shrinkage of the Polar ice-cap must react to the extent of 200 or 300 miles perhaps in the restriction or extension of the summer range of a species."

The Birds of Cameroon Mountain. By David A. Bannerman.—This is Part IV of the reports on the late Mr. Boyd Alexander's collections. Sixty-five species are listed. A list of species known to have been obtained about the base of the mountain is added.

Notes on Some Waders. By Ernst Hartert and Annie C. Jackson.—

A critical consideration of several species of *Charadrius*. *C. alexandrinus seebohmi* (p. 529) Aripo, northern Ceylon, is described as new and the type of "*Ægialitis homeyeri*" is shown to be made up of portions of two species.

On Some Petrels from the North-east Pacific Ocean. By G. M. Mathews and Tom Iredale.—As the authors state this is practically a 'remonographing' of certain genera in the course of which *Bannermania* (p. 578) is proposed as a new genus for *Oceanodroma hornbyi*, the type of which still remains unique; also *Cymochorea owstoni* (p. 581), Yokohama Bay, Japan; *Puffinus bannermani* (p. 594), Bonin Isl.; *Neonectris griseus pescadorensis* (p. 602), Pescadores Isl.; *N. g. missus* (p. 603), Kuril Isl.; *Bulweria bulweri pacifica*, (p. 607), Bonin Isl.; *Calonectris* (p. 592) for *Puffinus leucomelas*; *Microzalias*, (p. 597), for *P. nativitatis*.

Studies on the Charadriiformes.—I On the Systematic Position of the Ruff (*Machetes pugnax*) and the Semipalmed Sandpiper (*Ereunetes pusillus*), together with a Review of some Osteological characters which differentiate the *Erolinae* (Dunlin group) from the *Tringinae* (Redshank group). By P. R. Lowe.—Both of these birds in osteological characters are unquestionably members of the *Erolinae* whereas they have been universally regarded as *Tringine* in their affinities.

Bulletin of the British Ornithologists' Club. No. CCVI. April 28, 1915.

Mr. D. A. Bannerman describes *Dryoscopus angolensis cameroonensis* (p. 105) Cameroon Mountain; Dr. Van Someren proposes *Apalis nigriceps collaris* (p. 107) from Uganda.

Mr. C. F. M. Swynnerton discusses the coloration of eggs and the mouths of nestlings, and suggests that to a certain extent these may be due to protective mimicry. Certain eggs are found to be distasteful to 'egg-enemies' and others similarly colored may be cases of mimicry. The coloration of the mouths of certain nestlings was considered as the possible result of warning coloration. Mr. Stuart Baker opposed these theories.

Bulletin of the British Ornithologists' Club. No. CCVII. May 28, 1915.

Dr. van Someren (p. 116) described the following new birds from Uganda, *Cuculus mabirae*, *Scopelus pallidiceps*, *Bleda exima uganda*.

Dr. P. R. Lowe described a downy young of *Chionis minor* and stated that the osteology of the bird showed distinct affinity to the Skuas.

Mr. D. A. Bannerman presented a revision of the *Puffinus kuhli* group describing as new *P. k. fortunatus* (p. 120) from the Canary Islands. He recognizes five races, reducing the American *P. borealis* to a race of *kuhli*.

Bulletin of the British Ornithologists' Club. No. CCVIII. July 7, 1915.

Dr. van Someren described the following new birds from Uganda; *Turdus uganda* (p. 125), *Turdinus albippectus minutus* (p. 126); *Macrosphenus flavicans uganda* (p. 126); *Chlorocichla gracilirostris chagwensis* (p. 127); *Andropadus uganda* (p. 126); *Chlorocichla indicator chlorosaturata* (p. 127). The meeting was mainly devoted to a discussion on "The Effect of Environment on the Evolution of Species."

British Birds. VIII, No. 12. May 1, 1915.

The B. O. U. List of British Birds.—An interesting and instructive review by the authors of the 'Hand List.'

British Birds. Vol. IX, No. 1. June 1, 1915.

Additions and Corrections to the 'Hand-List of British Birds.' By the Authors.—This corresponds to an 'A. O. U. Supplement' but is commendably fuller in discussion of details of nomenclature, etc.

Notes on the Breeding Habits of the Gray Phalarope [*Phalaropus fulicarius*]. By Maud D. Haviland.—With photographs taken at the mouth of the Yenesei.

British Birds. IX, No. 2. July 1, 1915.

Notes on the Moults and Sequence of Plumages in Some British Ducks. By Annie C. Jackson.—This is an exceedingly valuable contribution to a mooted problem and it is gratifying to find that after the examination of a large lot of material the author comes to the conclusion that "in the ducks, 'colour change' plays no part and, that the different plumages are simply and naturally acquired by a moult only."

The central tail feathers of the Mallard which Mr. Millais in his 'British Diving Ducks' cites as evidence of color change are found to be molted twice a year instead of once as he supposed, which disposes of any necessity for color change.

Mr. T. Iredale and Dr. Hartert discuss certain questions of nomenclature. Two of these affect the 'A. O. U. Check-List' and demand our consideration, *i. e.*, *Hirundo* vs. *Chelidon*, and *Colymbus* vs. *Podiceps*. We consider that Mr. Iredale and the 'B. O. U. List' are correct in both instances. The type of *Hirundo* is *rustica* and that of *Colymbus* is *arcticus* both fixed by Gray. Dr. Hartert's plea that "Gray's action *in this case* should be rejected, because he was in ignorance" of the work of others, is the same old argument for exceptions to the rule. If we do not "construe" rules "rigidly," why have rules at all?

British Birds. IX, No. 3. August 2, 1915.

Notes on a Long-eared Owl Nesting on the Ground in Norfolk. By J. H. Gurney and Miss E. L. Turner.—With photographs from life.

Aviculture Magazine. VI, No. 7. May, 1915.

Patagonian Plovers and Trumpeter Birds. By Mrs. Gregory.

Spring Bird-notes from Various Scottish Islands. By The Duchess of Bedford (concluded in No. 8).

Jottings on Common Indian Birds. By Aubyn Trevor-Battye (concluded in No. 8).

Avicultural Magazine. VI, No. 8. June, 1915.

The Bird Market of Caracas. By Albert Pain.

Avicultural Magazine. VI, No. 9. July, 1915.

The Mikado Pheasant (with colored plate). By Mrs. Johnstone.

Cuckoo's Habits in the Breeding Season. By H. D. Astley.

Avicultural Magazine. VI, No. 10. August, 1915.

Birds in Flanders. By Dr. B. E. Potter.

Bird Notes from the Fjords. By R. Staples-Browne.

The Emu. XV, Part 1. July, 1915.

On the Comparative Osteology of *Orthorhamphus magnirostris* (the Long-billed Stone-Plover). By R. W. Shufeldt.

New Records for South-Western Australia. By W. B. Alexander.

Rookeries of the White-breasted Cormorant (*Phalacrocorax gouldi*). By A. W. Swindells.

Lewin's "Birds of New South Wales." By G. M. Mathews.

Descriptions of Nests and Eggs New to Science. By H. L. White.

Descriptions of Nests and Eggs of *Monarcha canescens* and *Neochmia gebracton albiventer*. By W. Macgillivray.

Observations around Anglesea, Victoria. By H. A. Purnell.

The Emu. XIV, Part 4. April, 1915.

An Expedition to the Musgrave and Everard Ranges. By Capt. S. A. White.—A region previously unexplored and found to be exceedingly dry owing to an almost continuous drought of nine years, 94 species listed.

Notes on the Genus *Pyenoptilus*. By F. E. Howe.—With excellent photographs of the nest and bird.

Birds of Wangaratta District, Australia. By Miss Gladys M. Cheney.—Annotated list of 204 species.

Further Notes on the Emu Wren (*Stipiturus malachurus*). By Miss J. A. Fletcher.

Nine half-tone plates of Australian Cuckoos' eggs with the sets in which they were found, illustrate an article which appeared in the January number and incidentally show what striking differences are often exhibited in the color of the egg of the Cuckoo and the birds upon which it is parasitic.

The South Australian Ornithologist. Vol. II, Part 2. April, 1915.

Birds of the Cairns District, Queensland. No. 2. By G. M. Mathews.

Birds Observed at Stonyfell, S. A. By R. Crompton.

Another New Bird for Australia. By S. A. White.—*Acanthiza marianæ* (p. 45) N. W. Australia.

A Sketch of the Life of Samuel White — Ornithologist. By S. A. White (concluded in Part 3).

The South Australian Ornithologist. II, Part 3. July, 1915.

Birds of the Cairns District, Queensland, No. 3. By G. M. Mathews. Grebes as Feather-eaters. By F. R. Zeitz.

The Austral Avian Record III, No. 1. June 30, 1915.

On *Columba pallida* Latham. By G. M. Mathews — with a reproduction of the original plate in colors.

On the Ornithology of the *Dictionnaire des Sciences Naturelles* (Levrault). By G. M. Mathews and T. Iredale.—The authors do not claim that their list is absolutely complete and we are able to call attention to one oversight. A new genus *Aethia* (Vol. I, Suppl., p. 71) based upon *Alca cristatella*.

Raperia godmanæ. A New Bird from Lord Howe Island. Now Extinct. By G. M. Mathews. Genus and species new (p. 21).

Two new subspecies. By G. M. Mathews.

Ixobrychus minutus victoria (p. 24) Geelong, Vic.; *Ethelornis magnirostris whillocki* (p. 24) Port Hedland, Mid-west Australia.

Revue Francaise d'Ornithologie. VII, No. 71. March 7, 1915.

On Hybridization in the genus *Paradisea*. By A. Menegaux — suggested as a possible explanation of certain "intermediate" species.

Birds and the Cholera. By X. Raspail.

Study of a Collection of Birds from India. By A. Engel (continued in April and May).

Revue Francaise d'Ornithologie. VII, No. 73. May 7, 1915.

Song Birds of the Environs of Vendome. By E. Coursimault — continued in June number.

Revue Francaise d'Ornithologie. VII, No. 74. June 7, 1915.

List of Birds Observed in Morocco, 1884-1914. By Hans R. Vaucher — continued in July number.

Observations on the Birds of the Dunes of Newport, Belgium. By Count de Tristan.

Messager Ornithologique. VI, No. 2. 1915.

Birds of Ussuri-land. By S. A. Buturlin.—Contains the following new form, *Perisoreus infaustus maritimus* (p. 104) Samargi River.

Remarks on the Avifauna of the Province of Kouban. By E. S. Ptouchenko.

Erythropus vespertinus transriphaeus nom. emend. (p. 126). By S. A. Buturlin.—In place of *E. v. obscurus* v. Tschusi (p. 128).

Uragus sibiricus ussuriensis subsp. nov. (p. 128). By S. A. Buturlin. Lake Khanka.

Pinicola enucleator sakhalinensis subsp. nov. (p. 129). By S. A. Buturlin. Chakvo, Saghalien.

Nucifraga caryocatactes altaicus subsp. nov. (p. 131). By S. A. Buturlin. Altaiskaia, Altai.

Strix uralensis yenesseensis subsp. nov. (p. 133). By S. A. Buturlin. From Krassnoyarsk.

A New Wryneck.—*Jynx torquilla harterti* subsp. nov. (p. 135). By G. I. Poljakov.—From S. W. Altai.

A New Waxwing — *Bombycilla garrulus centralasiæ* subsp. nov. (p. 137). By G. I. Poljakov — Zaissan district.

Pinicola enucleator altaicus subsp. nov. (p. 139). By G. I. Poljakov and S. A. Buturlin. Finn Lake, Marka Kul, S. W. Altai.

Contribution to the Geographic Distribution of the Genus *Sitta*. By J. B. Domaniewski. — A new form, *Sitta europæa sztolcmani* (p. 142) is described.

The Name of the Siberian Herring Gull. By S. A. Buturlin.—*Larus taimyrensis taimyrensis* Buturl. for the eastern race and *L. t. antelius* (Iredale) for the western.

On the White-winged Magpie (*Pica pica bactriana* Bp.) as a distinct subspecies.

Ornithologisches Jahrbuch. XXV, 5-6, September-December, 1914.

Contribution to the Ornithology of Syrmien. By E. Rossler.

On the Avifauna of the Upper Otzthaler Alps in Tyrol. By C. E. Hellmayr.

Migration of *Mormon arcticus* in the Mediterranean Region. By A. v. Jordans.

Ornithological Observations in the Vicinity of Jerichow. By U. Bährmann.

Journal für Ornithologie. Vol. 63, Heft 2. April, 1915.

Bernard Hantzsch's Ornithological Collections from Baffinland. By Eric Hesse.—38 species listed and discussed at length. The relationships of the Snow and Blue Geese are considered.

Wing Feather Characteristics in the Birds of North West Germany. By H. Reichling.

Remarks on the Eggs of Birds of Paradise. By H. Schalow.

Ornithologische Monatsberichte. May, 1915.

New Birds from the Eastern Frontier of Cameroons. By O. Neumann.—*Francolinus bicalcaratus adamae* (p. 73), Garna Adamaua; *Palaeornis krameri centralis* (p. 73) Gondokoro, *Caprimulgus houyi* (p. 73) Bodanga; *Crateropus reinwardti houyi* (p. 74) Gore, N. E. Cameroons.

Ornithologische Monatsberichte. June, 1915.

New African Species. By A. Reichenow. *Buccanodon leucogrammicum* (p. 90), Sanyi, German E. Afr.; *Barbatula leucolaima urungensis* (p. 91), Urungu, s. end of Tanganyika; *Malaconotus olivaceus pallidirostris* (p. 91), Patugese Guinea; *Campephaga quisqualina münzneri* (p. 91) Mahenge, German E. Africa; *Dicrurus münzneri* (p. 91) Sanyi, German E. Africa; *Cinnyris hofmanni* (p. 91), Magogoni, German E. Africa; *Chlorophoneus münzneri* (p. 91), Sanyi.

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¹ Some of these journals are received in exchange, others are examined in the library of the Academy of Natural Sciences of Philadelphia. The Editor is under obligations to Mr. J. A. G. Rehn for a list of ornithological articles contained in the accessions to the library from week to week.

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CORRESPONDENCE.

Methods of Recording Bird Songs.

EDITOR OF 'THE AUK.'

Dear Sir:—With great interest I read the "Suggestions for Better Methods of Recording and Studying Bird Songs," which appeared in the April issue of 'The Auk.' All methods of notation used in bird-work are open to some criticism and suggested improvements should be welcomed. This is particularly true in the study of bird-song, which has not enjoyed the scientific analysis from students, it should have had.

The title, given to the paper by Mr. Aretas A. Saunders, would indicate an entirely new method of notation. A perusal of the subject matter proves such is not the case. What he suggests is a modification of the old method of musical notation. An enlarged form of musical staff is used and notes are pitched within the limits of one octave. The chief difference consists in the representation of the notes by horizontal lines instead of by the musical dot at the top of a vertical line and the abandonment of the indication of rhythm for the sake of ascertaining a song's duration. Now a method of notation should be as comprehensive, accurate and simple as the subject under study will allow. Is Mr. Saunders' improved method more comprehensive, more accurate or more simple than the old. It must be one of these three to justify its employment in place of the older method.

In order to answer this, let us follow Mr. Saunders' order. He enumerates five characters of bird music, about which we desire knowledge: "pitch, duration, intensity, pronunciation and quality." Now this enumeration is peculiar to Mr. Saunders. The usual enumeration, followed by students of music, is "pitch, time, intensity, and quality" and these four factors are said to cover all that we can learn about any kind of music. "Time" is a much more comprehensive term than "duration" and covers not only the relatively unimportant factor of "duration," but also "metre" and the extremely important factor of "rhythm." The omission of time and with it rhythm is a serious one and at the outset renders doubtful any improvement by this method.

But avoiding for a moment a discussion of rhythm, I shall take up in order the five points he has selected. To begin with the third and fifth characters, he admits *quality* and *intensity* cannot be recorded accurately by his method. Of the fourth, *pronunciation*, he says:—"It is probably true that a purely musical note has no real vowel sound and that the only difference in such notes is that of quality and *not*¹ pronunciation." Of consonant sounds he has recognised only one, the "liquid L" and he represents this by a loop in his record, which at once blurs the pitch of that particular note. Such a blurring of the important factor of pitch can be avoided in the old method by recording these rare consonantal suggestions with graphic symbols above the staff. But the truth is that, if pronunci-

¹ Italics are not in the original paper.

ation does appear occasionally in bird songs, it is of very slight importance and should be classed as a minor factor under the heading of "quality", which covers also the much more important factor of "over-tones" or the so-called "harmonics" of a tone. These *do* exist in many bird tones and are the cause of the difference between the simple, clear-whistled tone of the Piping Plover and the complex rich tone of the Wood Thrush.

There remain but two of Mr. Saunders' "points" to consider, *pitch* and *duration*. "Pitch" is truly a very important factor and, with the possible exception of time, the most important of all, for from pitch we gain some idea of the bird's intuitive knowledge of the fundamental relations of one tone to another. It should be represented with exactitude, if that is possible. Now there are of course in some songs notes which seem patently discordant with the rest of the song. And in regard to these Mr. Saunders would have his readers believe that his method of notation is an improvement, because it records them. But does it? Helmholtz's study of sound proves that in order to represent a discordant note out of harmony even in the natural scale, it would be necessary to have a staff, composed of at least 528 horizontal lines for the one octave between Middle C and the next C above it, instead of the 12 of this new system, for there are at least that many possible tones within the compass of that octave. And for the octave, which is used to confine the song of the Vesper Sparrow, there would have to be at least 4224 different lines to record *one song!* Such a system I imagine would be too cumbersome even for Mr. Saunders. The fact is that our author has not tried to represent flatted and sharped notes with accuracy, but merely to indicate that they are flat or sharp. This is of no advantage to another song-student, for unless the flatted note is indicated precisely, it is impossible to be sure it was not an harmonically true note in the more complex natural scale, which the birds probably use. Every student of music knows that the modern scale of twelve notes and its method of notation is a condensation of the natural scale for the sake of simplicity and convenience. On the other hand the proposed system is more cumbersome without insuring one whit more of accuracy. It is a more cumbersome one, because it requires 12 lines instead of 5 to record a simple song and, for a song of great range such as the Hermit Thrush's, would require 36 lines, whereas the whole of that master song, ascending and descending over the confines of three octaves, can be neatly recorded by the old method on a staff of 5 lines! This new method is not so accurate for the recording of pitch, because short horizontal lines are employed against a horizontal staff instead of the vertical line crowned with a clear round dot. Indeed it is very difficult to determine from Mr. Saunders' printed records, when he is attempting to record a note on the pitch and when a trifle off of it.

It is at once apparent that the horizontal line is used for "pitch" in order that the vertical may be reserved for "duration." Indeed our whole system of notation, the evolution of centuries, has been changed in order to record this one thing, which has always been ranked by musicians as of very slight importance, *e. g.* the duration of a song in seconds. The length of a song

is of about as much value as the length of the white on the outer primary of a Junco. What we want to know about color is its arrangement or the relative proportion of the various colors on a bird, resulting in color pattern. What we want to know about duration is the *relative* duration of the individual notes of a song and this would result in some idea of the song's rhythm. Now the existence of rhythm is denied by Mr. Saunders, although oddly enough, it is shown to exist even by his own records. But of this later! The curious thing about it is that duration has always been indicated by the old system and can be quickly ascertained from any complete record. For instance in Mr. Matthews' record of the Vesper Sparrow's song in his 'Field Book of Wild Birds and Their Music,' the metronome time is given as one quarter note equals 120, which means that 120 of the quarter notes in that song, if it possessed that many, would occupy the time of one minute. From this one graphic symbol it is easy to calculate the duration of that song as exactly $5\frac{1}{2}$ seconds. If it were at all important to give this factor prominence, it would be much simpler to place the symbol "D $5\frac{1}{2}$ S" at the end of the musical staff than to cover the staff with a great number of useless vertical lines.

But far the most defective part of Mr. Saunders' system is its omission of rhythm. Even the non-musical bird student has recognised its existence, whether consciously or not. This is evident in such syllabic renditions of songs as "Téacher, téacher, téacher, téacher," which indicates quite clearly the observer perceived the fact that the first note of each couplet in that particular Ovenbird's song received a periodically reiterated accent and this is rhythm. It is also indicated in the rendering of the White-throat's song as "Óld Sám Péabody, Péabody, Péabody." Both of these birds have a splendid sense of rhythm, quite as good, if not better than the average musical performer of the human race. This is even more true of the Whip-poor-will, whose sense of rhythm is so perfect that his constant reiteration of the accented "Whfp" can be timed by a metronome exactly. Indeed his rhythm is too perfect to satisfy the human desire for variation, which humans obtain by means of the "ritard" and the "acceleration" and this song, therefore, becomes mechanical and monotonous. That the greater bird songsters are not so monotonous only proves their greater sense for real rhythmical effects, which can seldom be beautiful, when rigidly bound to a mechanical time. It is often true that one cannot check up the greater songsters' rhythm with a stop-watch, such as Mr. Saunders uses, but neither could one do the same with the best human singers, for they frequently retard and accelerate their time to avoid this very mechanical rhythm, which he seems to believe so essential to music.

That rhythm does exist in bird songs is curiously proved by Mr. Saunders' own records. In three of his nine, the rhythm is absolutely perfect, indeed mechanical and in the other six it probably existed, although obscured by his method of notation, which among other factors does not record the "accent". For instance in his record of the Robin's song there is a periodical alternation of sets of notes and pauses. Each set of notes consumes

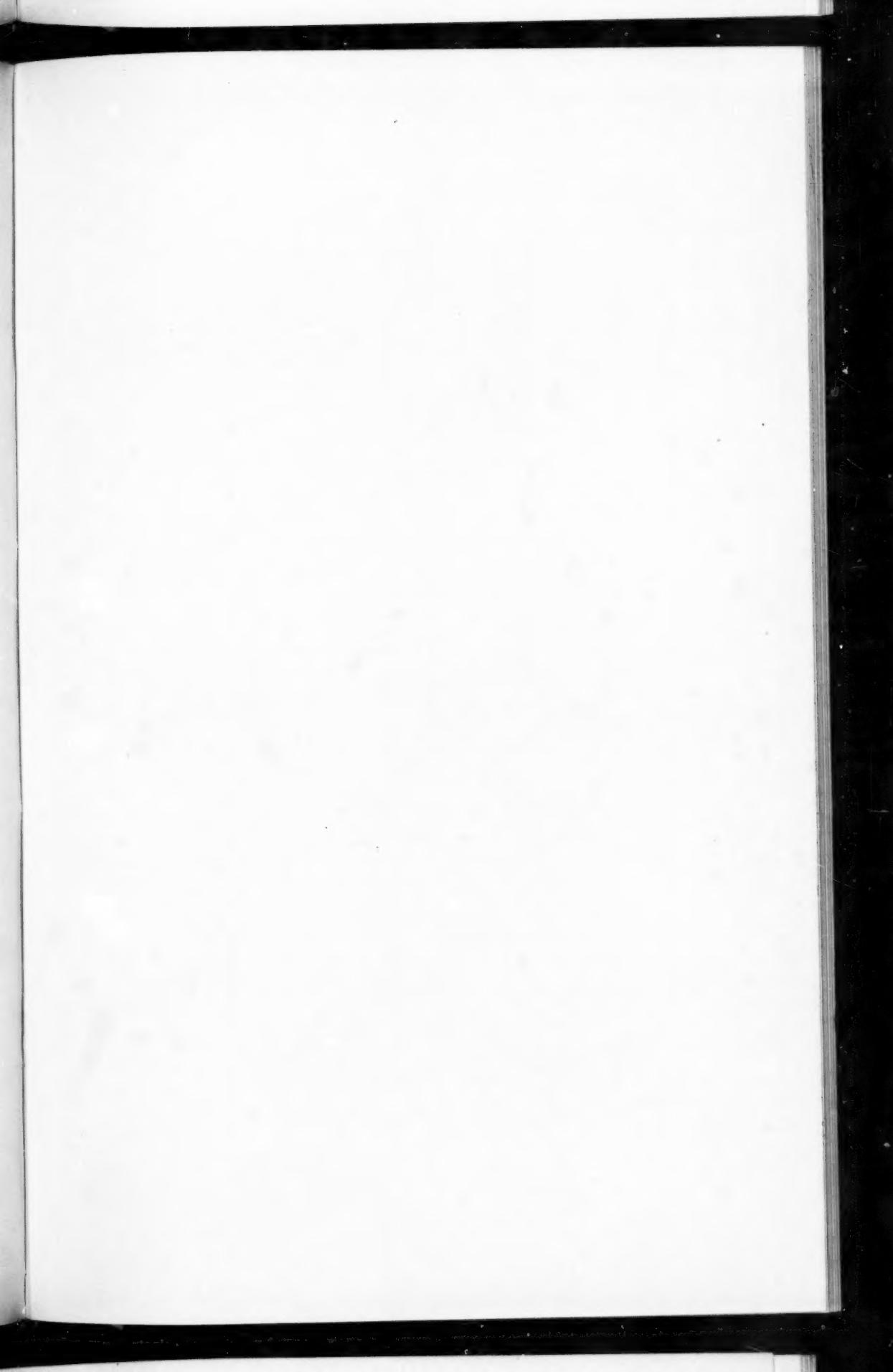
exactly the same amount of time, four tenths of a second, and each pause consumes two tenths of a second or exactly half the amount, credited to each set of notes. If we separate each set of notes and its adjoining pause into a measure we would have five equal measures and if we give each set of notes and its pause their proportionate amount of beats, we would give two beats to each set of notes and one to each pause. The whole song would then consist of five measures in perfect 3 time and to know this, e. g. that a wild bird uses naturally a measure of time, employed by humans for many centuries, is a great deal more interesting and important than to learn the detached fact, that the whole song consumed two and $\frac{1}{16}$ seconds by a stop watch. It must be admitted there are a few songs, which do not follow any given time through to the end, but Mr. Saunders is wrong, when he says that the old method "does not allow the record" of such songs. The irregular rhythm of the Thrasher's song is perfectly represented by the old method in Mr. Matthews' book and could not be represented so well by this new method.

By this discussion I believe I have proved that of Mr. Saunders' five chosen characters of song, two, *quality* and *intensity*, have not been recorded at all by his method; two, *pronunciation* and *duration* are unimportant and can and have been recorded by the old method; and the last, *pitch*, is not recorded so accurately. Finally a sixth factor of the utmost importance, *rhythm*, is entirely abandoned. The suggested method is therefore not so comprehensive as the old and, incidentally I have shown, it is not so simple nor so accurate.

Near the close of this paper Mr. Saunders remarks apropos of the qualities necessary for the student for the recording of bird songs that "a knowledge of music is essential also, but it need not be great." In my opinion the student should have at least an accurate knowledge of Harmony, but at any rate he should certainly know the meaning of ordinary musical terms. A common error of this kind is to confuse the meaning of the word "trill" with that of a "repeated note." As such a mistake renders many records inaccurate, it is necessary to point out that a "trill" is *not* a series of notes on the *same* pitch, repeated so rapidly that their number cannot be counted, but is a rapid and regular *alternation* of two notes of entirely *different* pitch.

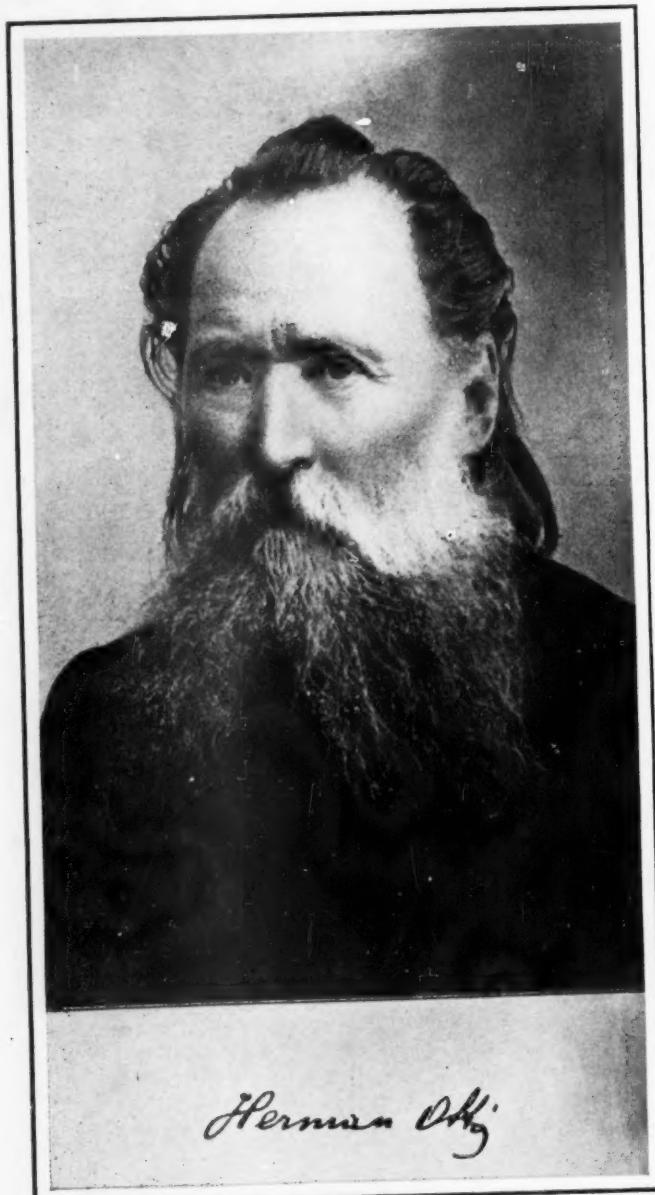
In conclusion I would like to state that the old system of notation is just as much a "graphic method" as Mr. Saunders' or any other. More than any other graphic system it is a splendid system of symbols, which has been evolved and improved by ages of use and is now better known to the public than any system of notation, used in the other departments of bird-work. It has its limitations and will probably be improved along the line of recording more accurately the natural scale, but such improvements as Mr. Saunders suggests are in the nature of a retrograde movement toward something less comprehensive and less simple.

ROBERT THOMAS MOORE.



THE AUK, VOL. XXXII.

PLATE XXXI.



DR. OTTO HERMAN.

NOTES AND NEWS.

GRAF HANS VON BERLEPSCH, an Honorary Fellow of the American Ornithologists' Union, died on February 27, 1915, in the sixty-fourth year of his age. He was one of the original Corresponding Members of the A. O. U. and was elected to Honorary Fellowship in 1890. He was one of the leading authorities on the birds of South America and had published many papers on the subject. Of late years he made a special study of attracting wild birds and had devised various styles of bird nesting boxes as well as methods of pruning trees and shrubs to encourage nest building in them. His estates in Germany where his ideas were put to practical tests were veritable bird sanctuaries. His loss will be widely felt in ornithological circles both among the museum systematists and the great host who are interested in the preservation of wild bird life.

DR. OTTO HERMAN, a Corresponding Fellow of the American Ornithologists' Union, died in Budapest, Hungary, on December 27, 1914, in the eightieth year of his age. He was born in Breznóbánya, June 27, 1835. His parents came from Zips, his father, Karl Herman, being a lying in surgeon in moderate circumstances. The surroundings of his home were extremely favorable to the development of the young, growing naturalist and all nature soon strongly impressed him. His father was a classmate of Johann Salomon Petényi, at that time the leader in Hungarian ornithology, and encouraged his son in all his juvenile expeditions, during which period young Herman made a collection of birds, preparing all the skins himself.

There being little money in natural science, his father became much concerned as to what to do with him as the time approached for his self-support, and finally sent him to the Polytechnic school in Vienna where he graduated and took a position as a factory draughtsman. Uncongenial as the life was he determined to win, and displayed the iron will, quick perception and faith in himself which were ever characteristic of him. Misfortunes, however, overtook him; first his father's death, then the discovery that he had been out of his country without permission, for which the government compelled him to serve twelve years in the army. Think of a nature like his being subjected to the iron ruling of military discipline!

It was but another instance of the square peg in the round hole, or, as a distinguished American ornithologist once put it: "To make a square peg fit in a round hole is impossible. One of two things must happen. Either the peg wears round, and sinks into the hole at last, or, if it stays square, works loose, and is gone. Nothing but friction in either case."¹

After the war between Poland and Russia in 1863, when Herman had volunteered as a soldier in the army of the former, he made application for the vacant position of taxidermist in the Museum of Siebenbürgen. Having

¹ The Medical Record, September 29, 1883, p. 343.

secured this position he was rapidly carried up the ladder of fame. With marked energy he helped to build up the zoölogical collections of the museum; wrote his first paper on ornithology, and diligently studied every phase of nature as it was brought to his attention. Later he became deeply interested in politics and was a member of the Hungarian Parliament, where he was instrumental in having laws passed which greatly advanced scientific research in Hungary. In 1877, he founded the official organ of the Hungarian Museum of Natural History and was its editor for ten years. The second International Ornithological Congress at Budapest was almost entirely under his management and its notable success was due to his powers of organization and capacity for work. The establishment of the Royal Hungarian Central Bureau for Ornithology was another conception of Herman's which was realized largely through his enterprise and 'Aquila', its official organ, was brought into existence and conducted by him through twenty large volumes.

His extensive investigations on bird migration are well known throughout the world.

While it is through his numerous ornithological works that he is probably best known, he made many valuable and often extensive contributions to entomology, ethnography, politics, political economy, folk-lore and Hungarian historical sketches. Among these may be mentioned a notable classic in three volumes on the spiders of Hungary and works on the Hungarian fisher-folk and Hungarian fisheries. Otto Herman was a man of great breadth of mind, enormous energy and an untiring worker. In his death not only did Hungary lose one of its most illustrious scientists, but the world lost a man who, through his own efforts, powerfully advanced the cause of science and human civilization, and who stood for all that was noble and great in his every undertaking.¹—R. W. SHUFELDT.

EGBERT BAGG, a Member of the American Ornithologists' Union, died July 11, 1915, at his home in Utica, N. Y. He was one of the original Associates of the Union, elected in 1883, and became a Member in 1914. Mr. Bagg was born in Utica, August 10, 1850, son of Egbert Bagg and Cornelia Hunt, and was educated in the Utica public schools, Hobart College and Cornell University. He was a successful business man and interested in the civic affairs of his native city, serving as school commissioner for some years. He was an active member of the Oneida Historical Society and other literary organizations. Among his ornithological publications were 'The Birds of Oneida County, N. Y.', 1894, and numerous notes on rare or interesting species which came under his observation.

EWEN SOMERLED CAMERON, a Member of the American Ornithologists' Union, and a frequent contributor to 'The Auk' died at the Southern

¹ In preparing this sketch I have employed data drawn from my numerous letters from Dr. Herman, and also the obituary notices by Lambrecht (Ornith. Monatsb. XL, pp. 138-142) and Stefan (Aquila XXI, 1914), for translating which I am indebted to my wife. The portrait is reproduced from another notice by Lambrecht (Barlangkutatas, 1915, III, Heft. 1).

California Sanitarium, Lamanda Park, Pasadena, California, on May 25, 1915. His death was caused by an abcess on the brain, the result of two accidents when horses fell with him. He had been dangerously ill for four months. Mr. Cameron was born December 19, 1854, and was the son of Allan Gordon Cameron of Barcaldene Ledaig, Argyllshire, Scotland; but for many years he has resided at Marsh, Dawson Co., Montana.

All of his spare time was devoted to ornithology which had been his favorite study from boyhood. He published 'The Birds of Custer and Dawson Counties, Montana,' in 'The Auk,' for 1907 and 1908, and a number of admirable detailed studies of characteristic species of that region, which were enhanced by the photographic illustrations contributed by his wife, who had a keen sympathetic interest in his ornithological work. Mr. Cameron also contributed to 'The Ibis,' 'Country Life' and 'The Field.' He was elected a Member of the British Ornithologists' Union in 1889, an Associate of the A. O. U. in 1903, and a Member in 1910, and a Fellow of the Zoological Society of London in 1888.

PROF. FREDERICK WARD PUTNAM, an Associate of the American Ornithologists' Union, died on August 14, 1915, in the seventy-seventh year of his age. Prof. Putnam was famous as an archaeologist and ethnologist, being professor of American archaeology and ethnology at Harvard University, Curator of the Peabody Museum of Archaeology and Ethnology and author of many papers upon Archaeological subjects. His interests extended beyond the field of his specialty and in early life he was active in several branches of zoölogy. In 1876-8 he was in charge of the Agassiz collection of fishes at the Museum of Comparative Zoölogy, and was one of the founders and editors of the 'American Naturalist.' His principal contribution to ornithology was a 'Catalogue of the Birds of Essex Co., Mass.,' published in 1856, which is virtually a list of the birds of the State. Prof. Putnam was born in Salem, Mass., April 16, 1839.

FRANK B. ARMSTRONG, of Brownsville, Texas, well known throughout this country and Europe as a collector and taxidermist, died at his home, on August 20, 1915, in the fifty-third year of his age. He was a native of St. John, N. B., of English parentage and was born on May 10, 1863. He was raised and educated in Medford, Mass., whither his parents had moved, and after graduating from the public schools he studied taxidermy in Boston under C. J. Maynard. About 1885, he travelled to Laredo, Texas, and collected extensively in that vicinity and in Mexico until 1890, when he moved to Brownsville. He was a skillful taxidermist and made excellent bird skins, and specimens bearing his name are to be found in all the large collections in America.

DR. THOMAS S. ROBERTS had been appointed Associate Curator of the Zoölogical Museum and Professor of Ornithology in the University of Minnesota and expects shortly to devote his entire time to this work. His address will be Room 209, Millard Hall, University of Minnesota, Minneapolis, Minn.

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ERRATA.

Page 95, line 36, for *dilophus* read *auritus*.
 " 100, " 19, for **Red-tailed** read **Red-shouldered**.
 " 185, " 15, for *philadelphia* read *philadelphica*.
 " 375, " 29, for *alhildae* read *alhildae*.

DATES OF ISSUE.

Vol. XXXI, No. 4 — September 30, 1914.
 " XXXII, No. 1 — January 1, 1915.
 " XXXII, No. 2 — April 1, 1915.
 " XXXII, No. 3 — June 29, 1915.

PERIODICAL ROOM
RECEIVED

OCT 8 1915

Old
Series,
Vol. XL

CONTINUATION OF THE
BULLETIN OF THE NUTTALL ORNITHOLOGICAL CLUB

New
Series,
Vol. XXXII

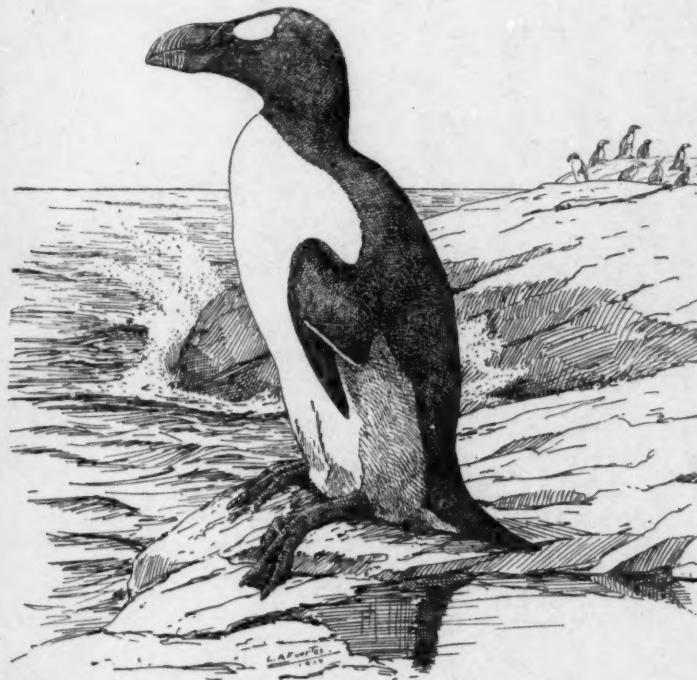
The Auk

A Quarterly Journal of Ornithology

Vol. XXXII

OCTOBER, 1915

No. 4



PUBLISHED BY

The American Ornithologists' Union

• • •
CAMBRIDGE, MASS.

Entered as second-class mail matter in the Post Office at Boston, Mass.

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"THE AUK," published quarterly as the Organ of the AMERICAN ORNITHOLOGISTS' UNION, is edited, beginning with volume for 1912, by DR. WITMER STONE.

TERMS:—\$3.00 a year, including postage, strictly in advance. Single numbers, 75 cents. Free to Honorary Fellows, and to Fellows, Members, and Associates of the A. O. U. not in arrears for dues.

THE OFFICE OF PUBLICATION IS AT 30 BOYLSTON ST., CAMBRIDGE, BOSTON, MASS.

Subscriptions may also be addressed to DR. JONATHAN DWIGHT, Jr., Business Manager, 2 EAST 34TH ST., NEW YORK, N. Y. **Foreign Subscribers** may obtain "THE AUK" through WITHERBY & CO., 326, HIGH HOLBORN, LONDON, W. C.

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